COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices

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Price: $15/year May 2, 1977 Vol. XI, No. 18

Checks User Survey

Package Users Happy (But Not Ecstatic)

By Don Leavitt
Of the CW Staff

PENNSAUKEN, N.J. — Current users of packaged software are generally pleased with their acquisitions and with the vendors behind them. But the pleasure is not ecstasy, according to Auerbach Publishers, Inc.

Installations last year were already committing substantial portions of their software budgets to outside purchases, and the percentage of that commitment is expected to rise sharply this year.

The 325 companies participating in a subscribers survey reported about 20% of funding for applications work and 60% of their outlays for "system software" went to external sources in 1976. Among those showing 1977 software spending expectations, the expenditures for outside application software were forecast as up to 68% ahead of last year and as much as 63% ahead of a year ago for outside systems software.

Large Users in Sample

Auerbach said it "expected a greater percentage [of the application funding] to have been spent on outside packages." However, it then noted the sample group basically represented the medium- to large-scale installation which already has many well-established applications and whose personnel are normally engaged in modifying, updating or expanding those operations.

"If the users [surveyed] were smaller companies employing small business computers or minicomputers for their applications, we believe the proportion of expenditures for external software would be higher," Auerbach said in a report of its survey findings published last month.

When they asked for more detailed breakdowns of how the "outside" dollars were spent or budgeted, the researchers found an "expectedly high" percentage of dollars going to data communications, data base management and systems monitors/job accounting packages.

In-House Dollars High

While a "fairly high" percentage of dollars was spent on payroll/personnel, accounts receivable and accounts payable application packages, there was also a substantial amount spent on these areas in-house. Auerbach attributed these "somewhat surprising" findings to particularly individualized systems, the report said, or in-house modification of packages found to be inappropriate.

Finally, Auerbach theorized the staffs of many of the reporting companies may be so large that continued use of in-house personnel is needed to prevent attrition when there

(Continued on Page 4)

Fills Gaps in Growth Path

NCR Expands 'Mid-Range' Systems Line

By Frank Vaughan
Of the CW Staff

NEW YORK — Three "mid-range" computer systems consisting of five models were introduced here last week by NCR Corp. When they are supplemented by additional releases this fall, the systems will give NCR users a logical growth path from the smallest entry-level system to the larger and more advanced systems, the vendor said.

In announcing the N-8350, N-8450, V-8450, N-8560 and V-8560, NCR noted the models fall under a revised numbering system that gives all current-generation systems an "8000" series designation.

In the five-character alphanumeric numbering system, the second digit of the model number indicates the type of processor; the third digit describes the relative power within the processor class; and the last digit indicates special-purpose models.

The letter appearing before each model number designates the primary operating mode, a spokesman explained. The prefix "N" indicates the model uses NCR Century software; a "V" indicates virtual storage; and an "I" would denote an interactive operating mode.

The N-8450 uses a "multiple-mode" processor derived from NCR's Criterion-type architecture and provides an upward migration path for current Century users, the firm said. The V-8450, using the same basic processor, offers the user the opportunity to operate in a virtual storage mode.

The V-8560, the most powerful of the systems introduced, employs Criterion architecture and NCR's Virtual Resource Executive (VRX) operating system. It fits halfway between NCR's first two Criterion models (V-8550 and V-8570) introduced last year.

NCR Corp. V-8560

The N-8560, available with a smaller memory than the V-8560, provides an upward growth path for all N-mode users as well as Century system users.

The N-8350 utilizes Century architecture and Century software.

(Continued on Page 4)

Congress Expected to Put End To '78 Plans for VA's 'Target'

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The Veterans Administration's (VA) $122 million "Target" claims processing system is an unlikely candidate for fiscal year 1978 funding, a Capitol Hill source said here recently.

House and Senate appropriations subcommittees are primed to put an end to this year's discussions on Target as soon as a report on the project by the General Accounting Office (GAO) is formally released, sources said.

A draft of the report obtained here charged the VA with risking cost overruns, schedule slippages and "an unworkable system once Target implementation is complete."

When the final report on the system is formally released, it will recommend that Congress vote against the $21.9 million appropriation requested by the VA for the next fiscal year.

The GAO report on the proposed Target system was requested by Reps. John E. Moss (D-Calif.) and Charles Rose (D-N.C.) about a year ago because the two were concerned about Target's ability to keep confidential the information maintained on veterans.

Along with cost and scheduling problems, the report revealed some serious inconsistencies in the VA's plans for the system.

Target would be used to service the files of seven million VA beneficiaries who receive

(Continued on Page 6)

U.S. Public Wants Privacy Rules

NEW YORK — Seventy-five percent of the American public would support legislation that would "lay down rules for the way business and other private organizations should deal with information" about individuals.

This was one of the findings in a recent public opinion survey conducted by the Louis Harris organization.

The survey also showed 67% of Americans believe individuals surrender their privacy as soon as they seek credit; a year ago, the public was evenly divided on that question.

The percentage of Americans who feel "threatened" by files of personal data has grown from 23% in 1974 to 32% today, the survey indicated.

Half of those surveyed believe the federal government and credit companies are the largest collectors of personal information and, of the two, they think the government's files pose a greater threat to them than those maintained in the private sector.

Harris attributed the increase in concern for personal privacy "to the steadily accumulating demands for information by many organizations."

The public generally agreed the period for which data is retained should be limited as follows: arrest records and results of psychological tests, one year; traffic violations and intelligence tests, three years; credit information, five years rather than the present seven; mental health records, six years; school records, eight years; employment records, 10 years; police conviction records and medical records, up to 25 years.

Records of telephone calls and political affiliations should not be retained at all, according to the majority.

State May Face 'Catch 22' On Privacy Front

By John P. Hebert
Of the CW Staff

BOSTON — Conflict between Massachusetts privacy laws and legislation enacted last year designed to penalize bad drivers may push this state and its auto insurance industry into a "Catch-22" situation.

But the information system required to implement the 1976 drivers' Merit Rating Law is, by itself, a much greater problem.

At the end of last week — only two months before the Merit Rating System is required to be in full swing — there wasn't any system.

Privacy Considerations

On the privacy front, the state legislature must reconcile differences between its Fair Information Practices Act of 1975, the Criminal Offender's Record Information (Cori) Act of 1972 and the new Merit Rating Law before the now-nonexistent information system can be made effective, according to Daniel Jaffe, assistant attorney general.

At present, the laws prohibit insurance agents from accessing drivers' moving automobile violations. The Fair Information Practices law has small conflicts which can easily be amended because of its nonstatutory nature, Jaffe said, adding the Cori law poses a larger problem.

Jaffe, who is possibly the only state employee working on changing the Cori law, drafted and submitted an amendment to Beacon Hill legislators on Feb. 22 to change an "overrestrictive definition of information dissemination."

At week's end, the lawmakers had not reached a decision on the matter.

"I don't see this as an insurmountable

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Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. Copyright 1977 by Computerworld, Inc. All rights reserved.

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Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

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Reverses N.Y. Court Decision

Supreme Court OKs Patient Identifiers

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. — In a unanimous decision, the U.S. Supreme Court recently reversed the 1975 decision of a New York Federal District Court which had prohibited the state from using patient identifiers on narcotic prescription forms processed by a state computer system.

In its ruling, the high court declared that the New York Department of Health's patient identification requirement is a reasonable exercise of the state's broad police powers and that the possibility of privacy violations resulting from use of the identifiers is remote.

Although Schedule II narcotics — including opium, its derivatives and the widely used amphetamines — are the most dangerous of legitimate substances, they have a recognized medical use. The purpose of the state's program is to assure these drugs are not being abused through multiple prescriptions [CW, Dec. 6].

But while the processing of the names, addresses and ages of prescribed Schedule II narcotics recipients now has been sanctioned by the Supreme Court, opposition to the practice remains.

Michael Lesch, attorney for the plaintiffs who brought the case against New York State last year, called the Supreme Court verdict "unfortunate" and predicted the identifiable patient data will be abused.

The court has held there is no recognition of the right of privacy for individuals who need the medically prescribed drugs, he said.

Lesch said he believes the computer is central to the case because it allows immediate access to patient's names for as long as five years. Further, no safeguards prevent the state from extending the storage time, he added.

In an opinion delivered by Justice John Paul Stevens, the Supreme Court said the right to collect and use such data for public purposes is typically accompanied by a statutory or regulatory duty to avoid unwarranted disclosures, as is the case with New York's Controlled Substances Act of 1972.

That law requires narcotics prescribers and providers to complete and submit a three-part prescription form to the Department of Health in Albany for processing and storage.

A concurring opinion written by Justice William J. Brennan Jr. also addressed the question of whether information stored in a computer system is more susceptible to disclosure than data stored in a manual system.

In it, Brennan said, "The central storage and easy accessibility of computerized data vastly increases the potential for abuse of that information and I am not prepared to say that future developments will not demonstrate the necessity of some curb on such technology."

Brennan also pointed out that the Fourth Amendment of the Constitution "puts limits not only on the type of information the state may gather, but also on the means it may use to gather it."

Collection Continues

Until there are curbs on information technology, New York will again collect patient identifiers for use on its Burroughs Corp. B6700 mainframe, according to Eugene Cahalan, acting assistant commissioner for food and drug protection at the New York State Bureau of Control Substances Licensing.

About 564,000 at New York State residents abuse drugs, according to testimony before a state Assembly committee on mental health last January given by William F. Leavy, deputy commissioner for the New York Health Department.

While the high court was considering its appeal, the state dropped its use of patient identifiers and collected only those of physicians and pharmacists.

But even with these restrictions, the system turned up some abusing physicians, Leavy said.

Three physicians were stripped of their privilege to obtain and use the triplicate prescription form for flagrant violations. In addition, 13 physicians were charged with abuses in dispensing controlled substances between the time the 1972 act was passed and November 1976, when the data was compiled, he said.

Ruling on Identifiers to Affect States Planning Drug DP Systems

WASHINGTON, D.C. — The U.S. Supreme Court decision that removed the legal obstacles barring New York State from collecting patient identifiers on narcotic prescriptions will have a positive effect on states planning similar systems, according to a Federal Drug Enforcement Administration official here.

However, the official said he doesn't anticipate any "great race" to develop further systems now that the Supreme Court has approved the practice.

Besides New York, Illinois, California and Idaho have drug tracking systems, he indicated.

Illinois' present system is a reorientation of the system the state has used for 18 years, according to Dr. John Fultz, chief investigator of doctors for the state's Department of Registration and Education.

Fultz noted the system began scrutinizing drug pushers — illegal providers of the controlled drugs — rather than users last July. After that time, there was a marked change in dispensing habits, he said.

In June and July, printouts showed that of the state's 7,000 licensed prescribers, 1% wrote 22% of all prescriptions, Fultz stated.

By October, only 10% of the prescriptions were being written by that 1% of prescribers, while the number of prescriptions written dropped insignificantly, he added.

Illinois regards the computer as a useful tool for pinpointing over-prescribing physicians, according to a spokesman for the Department of Registration, which licenses physicians to dispense the drugs.

And there is opposition to the practice of compiling patient names in Illinois, as there is in New York, the spokesman noted.

Fultz, who has revoked or suspended the licenses of 15 doctors in the past 18 months, agreed consumer groups could have a legitimate concern over the privacy of information gathered on drug recipients.

Illinois' State Medical Society is the only group opposed to the practice and its opposition is based on objections to "government intrusion into the practice of medicine" rather than concern for privacy violations, Fultz maintained.

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Stockholders Hit IBM on Sales to Chile, South Africa

By Toni Wiseman
Of the CW Staff

NEW YORK — Do computer manufacturers have an obligation, moral or otherwise, to police their customers' applications?

This question was raised at IBM's annual shareholders' meeting here last week where controversy arose over IBM's sale of equipment to countries — notably Chile and South Africa — where the equipment is allegedly used to repress human rights.

Rev. William L. Wipfler of the National Council of the Churches of Christ initiated the quasi-debate, one he has been pursuing with IBM board chairman Frank P. Cary for some time. Wipfler called for IBM to prohibit the further sale of computers and cease all servicing of equipment currently in Chile until civil liberties are restored.

Can't Control Customers

At the meeting Cary responded, "IBM would not bid business where it believed the equipment will be used to abridge human rights, but I don't see how IBM or any other company can control the actions of our customers and it would be [senseless] to espouse a policy we cannot enforce."

The use of information does not depend on the availability of computers, Cary noted, implying the Chilean secret police could carry on its activities just as well without a computer.

Not 'Political Tool'

Cary reemphasized IBM's position that it is the government's role to determine controls and licensing policies and stated that IBM "will not allow [itself] to be a political instrument for any group."

IBM has in fact investigated the alleged repressive uses of computers in Chile and has found no such instances, he added.

Responding to a second shareholder's opposition to IBM's presence in South Africa on similar grounds, Cary said IBM will "contineu to review the situation. I believe that our presence there is a positive example and influence and therefore is a much better force for change than withdrawal."

Catamore Goes to High Court

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — The case of an unhappy user vs. IBM has reached the doorstep of the U.S. Supreme Court.

Catamore Enterprises, Inc. has petitioned the high court to reconsider the First Circuit Court of Appeals' ruling vacating a jury's decision and ordering a new trial [CW, Oct. 4, 1976].

After a three-month jury trial, the Rhode Island jewelry manufacturer was awarded $11.4 million in damages and ordered to pay IBM the $68,453.23 it owed for back rent on systems the size of a 360/20 [CW, July 9, 1975].

The appeals court overturned this verdict on the grounds that a Systems Engineering Services (SES) contract, written in 1970, was partially integrated into a 1968 oral agreement for delivery of software for a production control system.

The one-year statute of limitations in the written contract applied to the oral agreement as well, the court ruled.

The writ of certiorari treats the issues of "invited error" in the judge's charge to the jury, the fact IBM did not raise the grounds on which the appeals court ruled and the denial to Catamore of its Seventh Amendment right to a trial by jury.

Based on 'Error'

The Catamore brief claimed the appeals court improperly vacated the jury verdict on the basis of an "error" in the judge's charge. This "error" was "invited" by IBM since IBM inserted it into the judge's charge, Catamore contended. IBM then failed to object to the charge in accordance with Federal Rules of Civil Procedure 51.

Catamore claimed the appeals court could not conclude the one-year limitation clause applied to the SES agreement since IBM, in its motion for directed verdict, never mentioned the partial integration of the contracts.

"If the First Circuit opinion is allowed to stand, disappointed litigants will be able to circumvent the mandate of Rule 51 described by the Seventh and Ninth Circuits as making known to the trial court the objections and the grounds therefor, by claiming that they raised the purely legal objection . . . [and thus] fully apprised the district court," according to Catamore.

'Hair-Splitting' Language

"The kind of hair-splitting language distinctions thus facilitated in light of 20/20 hindsight in analysis of actions at trial for wholly unrelated purposes after a lost jury verdict would totally frustrate the requirements of Rule 51,"the brief stated.

In addition, the court of appeals took away Catamore's right to a trial by jury when it issued an opinion and order based only on one version of the facts and thus removed the determination of other versions of the facts from the jury on a second trial, the Catamore brief stated.

The decision of the First Circuit Court of Appeals "has so far departed from the accepted and usual course of judicial proceedings that it represents a dangerous precedent which will further encourage the significant and recurring problem of appellants raising issues for the first time in the appellate court after full and lengthy trial," the Catamore brief stated.

Note to Readers

An advertisement has run in *Computerworld* for a "Computer Software Directory" from a firm of the same name (CW, Sept. 6, Sept. 20, Oct. 4, Oct. 18).

Several readers have contacted us indicating that the box number given in the ad is no longer in use and that attempts to call the telephone number listed in the ad have been unsuccessful.

Any reader who has had a problem contacting the organization in question or has sent money without receiving the directory should contact the Department of the Attorney General, Commonwealth of Massachusetts, 1 Ashburton Place, Boston, Mass. 02108. The phone number is (617) 727-8400.

The LIBRARIAN® and MetaCOBOL® from ADR Boost Efficiency at Computer Power, Inc.

Computer Power, Inc., Jacksonville, Florida, provides complete data processing services for a number of banks, mortgage bankers and saving and loans whose mortgage portfolios have over 1,250,000 mortgage loans valued at over 24 billion dollars.

Over 8,400 program modules are now used to provide client services—modules which require storage space equivalent to 2.7 million card images.

Until The LIBRARIAN was installed, program storage and management was an expensive and time consuming problem

According to Technical Support Manager Roy Fileger, "Before we installed The LIBRARIAN, we stored everything on 17 IBM model 2314 disk packs. That meant we had 17 different source statement libraries. We were making 1000 pack changes a month and we were spending over 50 hours of computer time each month reorganizing files."

"Program standardization was a problem too. Programmers would make changes to one pack and not duplicate the changes on the other packs."

The LIBRARIAN enabled Computer Power, Inc., to cut disk storage by 94%.

After The LIBRARIAN was installed 2 years ago the entire source statement library was immediately compressed with the result that Computer Power, Inc., using the IBM 3330 disk system, now stores all of its 8400 program modules on a single disk, constantly on-line. The benefits were far greater than just the savings in disk use, however. Time required for file reallocation was virtually eliminated. Elimination of disk shutdowns and disk changes added another 50 hours a month of usable computer time. And standardization rapidly improved because common program changes no longer had to be duplicated on many different disks.

"We really have file backup now. And that's tremendous."

Roy Fileger remembers, "When we had 17 packs our backup and savings procedures were extremely time consuming. Now, with The LIBRARIAN and only one disk pack, we are able to save everything every single day in just 20 minutes."

ADR's MetaCOBOL is doing more than just conversion.

Computer Power, Inc., is in the final phases of conversion of more than 6000 program modules from DOS to OS/ANS. According to Roy Fileger, "We're running through MetaCOBOL and coming out with state-of-the-art programs, OS/ANS, single entry, single exit with I/O completely changed. All the programs we have converted so far have executed perfectly the first time."

Programs are being standardized as they go through MetaCOBOL.

"Everything coming out is looking alike. MetaCOBOL is picking up errors in violation of COBOL specifications that the compilers would let go through. As a result, our programs are really coming out clean," he continued.

"As far as I know, there is no alternative to MetaCOBOL."

"Any other system would have required hand-made changes involving a staggering amount of time," Roy Fileger added.

ADR software products are an integral part of over 5,000 installations worldwide. Each ADR product is not just a program, but a complete package with full documentation and on-site support. ADR is the only software company with 50 branch offices and representatives in 31 countries—each staffed with ADR-trained technicians.

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HIS Joins Ranks Of Price Cutters

WALTHAM, Mass. — In what was admittedly a response to "recent competitive actions in the marketplace," Honeywell Information Systems, Inc. last week cut prices on memories for its large-scale systems.

The price reductions, effective yesterday, affect the firm's Series 60 Level 66 and Level 68 systems as well as the older 6000 series which is "no longer being actively marketed," according to a spokeswoman.

Memory purchase prices were decreased 35% and rental prices were dropped 14% on memory modules above 512K words for the levels 66 and 68. The purchase price for the 6000 memory was also reduced by 35%, the company noted.

A 256K module including memory and addressing formerly priced at $247,584 now costs $162,584, an $85,000 reduction.

The memory price reductions represent reduction of about 2% in overall system cost and can be attributed to the introduction of memory technology using 16-pin and 22-pin chips, the spokeswoman said.

The Level 66 spans a performance range from about the power of an IBM 370/138 to somewhere between the 370/158-3 and the 158-3 attached processor version, the spokeswoman said. The 66/88 model is "somewhere between the IBM 168-3 single processor and the 3033 in performance," she added.

A 66/60 dual-processor configuration, for example, with 768K of memory, five disks with 2.3G bytes of storage, two 1,200 line/min printers, two 1,050 card/min readers, one 100 card/min punch, 11 tape drives and a Datanet 6600 front end with 43 communications lines formerly cost $4,290,495 and now costs $4,205,495. Rental on a five-year contract was $90,670/mo and is now $89,480/mo.

GENERAL SPECIFICATIONS	N-8350	N-8450	V-8450	N-8560	V-8560
STANDARD					
Processor Cycle Time	1.2 microsec	112 nsec	112 nsec	84 nsec	84 nsec
Minimum Main Memory (Bytes)	32K	128K	384K	192K	384K
I/O Trunks	2	1	1	3	3
OPTIONS					
Memory Increments (Bytes)	32K	64K	64K	64K	64K
Maximum Main Memory (Bytes)	128K	1M	1M	1.5M	1.5M
Additional Trunks	2	3	3	2	2
Integrated Disk Control (IDC)	-	1	1	1	1
Disk Strings on IDC	-	1	1	2	2
Spindle/String	-	8	8	8	8
Integrated Communications Lines	10	20	20	20	20
LANGUAGES					
Cobol	Yes	Yes		Yes	
Neat/3	Yes	Yes		Yes	
Fortran	Yes	Yes		Yes	
NCR RPG	No	Yes		Yes	
NCR Basic	Yes	Yes		Yes	
I/O PERIPHERALS					
Card Readers	No	Yes		Yes	
Card Punches	No	Yes		Yes	
Paper Tape Readers	No	Yes		Yes	
Paper Tape Punches	No	Yes		Yes	
Micr Sorter/Reader	Yes	Yes		Yes	
Matrix Printers	No	Yes		Yes	
Line Printers (Line/Min Maximum)	2,000	3,000		3,000	
MAGNETIC FILE PERIPHERALS					
Disk Units (Byte/Unit Maximum)	9.8M	200M		200M	
Magnetic Tape Units	Yes	Yes		Yes	
PRICES (Standard Configuration)					
Rental (Monthly)	$2,210	$2,475	$4,075	$5,030	$6,330
Purchase	$69,650	$90,900	$142,250	$195,200	$237,050
Deliveries Begin	July 77	4th QTR 77	3rd QTR 78	4th QTR 77	4th QTR 77

NCR Adds 'Mid-Range' Systems

(Continued from Page 1)

The smallest system introduced, it is primarily a disk-based system.

When fully developed, the 8000 series will range from very small business systems renting for less than $1,000/mo to large systems with memories well over 2M bytes, according to the spokesman.

NCR's present Century series will gradually be succeeded by newer 8000 series systems, he added.

Systems Philosophy

The firm's systems philosophy is keyed to both responding to new trends and to protecting and enhancing the large investments users have made in their present systems, the spokesman said.

NCR's plans to release larger systems do not mean it intends to compete in a direct model-by-model effort with IBM, he contended. It does mean that within selected high-growth markets targeted by NCR the company will be offering a full spectrum of DP systems, he said.

These markets include manufacturing companies, retail industry, banks and thrift institutions, wholesale distributing companies, construction companies, hospitals, schools and local and state governments, according to the spokesman.

Purchased Software Making Users Happy (But Not Ecstatic)

(Continued from Page 1)

is no other internal project to keep them busy.

General ledger is the most common of the purchased applications "probably due to the wide similarity among such accounting systems" while application systems unique to individual companies account for a "high degree" of in-house development expense, the report said.

Happy, Not Thrilled

Getting down to specifics on how well the users liked what they were getting from the outside sources, the survey asked for a four-point assessment — excellent, good, fair, poor — on each of nine criteria. These ratings were not tied to specific products, but to the user's general experience with external software products.

The report tabulated the number of responses for each rating on each of the characteristics. Taking a weighted average of the responses for each characteristic, the entire spectrum fell between the good and fair rating.

Support Rated Lowest

Software vendors fared worst in the categories of quality of documentation and quantity and quality of support. However, the vendors still rated well in terms of user satisfaction, expressed as "value of investment based on dollars spent."

Auerbach then asked the users to assess the effectiveness of four classes of potential software suppliers: mainframe vendors, independent software houses, consultants and "other." Within that range, users gave the highest number of excellent ratings to independent software houses, the lowest number to consulting firms.

Typically, however, they rated each source "good" and the independent software houses earned as many "fair" as "excellent" ratings.

Nod to the Future

To summarize the situation, Auerbach asked its subscribers, "Based on past experience, do you plan to purchase more outside software products?" Sixty-two percent of the users said "yes," another 26% gave a tentative "yes" and only 12% said no, indicating a satisfactory experience, the researchers concluded.

Auerbach's 10-page "Software Expenditure Survey," cataloged as REV 1-01-06, is available for $7. The company is at 6560 North Park Drive, Pennsauken, N.J. 08109.

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Tennessee Governor Signs Amended Software Tax Bill

NASHVILLE, Tenn. — Gov. Ray Blanton recently signed into law a bill that, after several amendments, defines software as tangible personal property and therefore subject to Tennessee's 5% sales and use tax effective July 1.

However, Senate Bill 224 is different from that which originally was expected to reach the governor's desk [CW, April 4], according to legislative aide Nelson Biddle.

The old bill covered both input and output from a computer, but the new legislation only specifies input, he noted.

Under the bill, tangible personal property specifically includes "customized or packaged computer software which is defined to mean information and directions loaded into a computer which dictate the functions to be performed by the computer whether contained on tape, disk, cards or other devices or material."

The new regulation therefore levies sales taxes on the value of programs pertaining to input and the functions of the computer, Biddle explained.

The Tennessee Supreme Court ruled software was intangible and therefore not taxable in the case of Commerce Union Bank vs. George M. Tidwell [CW, Aug. 30].

Although Biddle said he thinks the regulation is subject to challenge, he recommended the governor sign it and see what happens. "If it goes to court again, maybe we can clarify the issue once and for all," he said.

The amendment which defines input as tangible property "is rather ambiguous," Biddle said, "since it doesn't talk about the information that comes out.

"If you're going to tax programming, you ought to tax information that comes out. You either do all or nothing, it seems to me," he stated.

The original bill was broader and included anything that can be weighed, measured, felt or touched such as cards, tapes, disk and data or information transferred onto and from any such physical material, Biddle said.

The bill's route to the governor's desk was tortuous. After the industry heard about the bill and protested, the Senate amended it to tax only the value of the media itself on which the software was contained, Biddle said.

But that would have reduced the revenues to be realized by the state, he added.

It was then amended for the final time to include the value of the input and instructions.

The Department of Revenue wanted to put software taxation on the books and see if it would be stricken down, Biddle said. The department had been taxing without direct legislative authorization, he explained.

Adapso Rallying to Fight Taxes

The Association of Data Processing Service Organizations (Adapso) has formed groups to fight taxation in four states: Missouri, California, New York and New Jersey.

Though their goal is the same, their approaches will vary. The group in Missouri, for example, intends to pursue a suit seeking a judgment on whether state regulations allowing assessment of the 4% sales tax on DP services are valid, according to Tom Collins of NLT Computer Services Corp.

The group, which is seeking financial support for its efforts, has engaged a law firm to challenge the state regulations, he added.

The declaratory judgment is being sought because other avenues have been tried with no results, he said. A request for a declaratory judgment may be filed without regard to a specific instance or court case, he explained.

Collins is asking those interested in joining the Missouri effort to contact Adapso headquarters in Montvale, N.J.

The California group, whose membership represents all phases of the industry from custom and packaged software to processing and keypunch services, has as its immediate goal the reversal of the State Board of Equalization's interpretation of the tax statutes, according to chairman Donald B. Mulvey.

Rather than battling on a piece-by-piece basis, the group hopes to present a case which argues against taxation for all the areas pertaining to services and resolve the issue, he said.

The group intends to select a law firm and then, at a mid-May meeting, will gather all those interested in financially contributing to the cause, he said.

Mulvey said the fate of taxation in California may be of interest to other locations since several states reportedly have adopted California's statutes.

Mulvey is president of Computer Services Associates, P.O. Box 13172, Oakland, Calif. 94661.

Power Control Link Considered for Fips

WASHINGTON, D.C. — The National Bureau of Standards (NBS) is considering the second in a series of planned computer peripheral interface standards intended to improve the interchangeability of computer peripheral components.

The proposed Federal Information Processing Standard (Fips) for the channel-level power control interface includes functional, electrical and mechanical specifications that offer a sequential and interlocked means of controlling power supplied by a CPU to the attached devices, the NBS said.

The attached devices include I/O channels, control units, I/O devices and/or free-standing storage units.

Manufacturers, the public and state and local governments are invited to review the proposed standard and submit comments to NBS Office of ADP Standards Management, Washington, D.C. 20234, before May 31. Copies of the proposed standard can be obtained from this NBS office.

The specifications were developed by the X3T9 committee of the American National Standards Institute (Ansi) and are being considered by the X3 committee for adoption as an Ansi standard.

Ansi has a package of both the I/O interface and the power control standards along with views of proponents and opponents for $6. It is available from Cbema, Attention: X3 Secretary, 1828 L St. N.W., Washington, D.C. 20036.

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Mass. Nearing 'Catch-22' Situation on Privacy Front

(Continued from Page 1)

problem because the legislature is anxious to clear the problems. Nobody wants to be blamed if merit rating doesn't make it. The legislature has a stake [in the matter] and it's too simple an amendment not to act on it," Jaffe said.

The state's attorney added, however, there will be a "real problem" if the legislators do not pass the one-paragraph amendment.

In the worst-case analysis, the Cori-Merit conflict could cripple the rating system put into effect on Nov. 1. It would preclude insurance agents from being able to obtain records and thus explain surcharges to policyholders, as well as prohibiting policyholders from seeing the driving records of their family members, for example.

The privacy problem centers on the word "conviction," which Jaffe maintained is a matter of substance, not language.

The Cori laws are too restrictive in terms of the new merit system and motorists' convictions for moving violations, he said.

Cori laws apply because the convictions result from a criminal court disposition and the filing of formal criminal charges, he explained. Only the person convicted of a violation can access the records.

Massachusetts changed to a merit system because it recognized the need to replace its former policy of standardized rates for all drivers, instituted in the early '70s.

That "no-fault" law was dropped and insurance companies were once again allowed to charge different rates and charge surcharges to bad drivers.

Under the plan, that excess money, which has not been collected from any drivers convicted since the merit law took effect, would be returned via the state and insurance companies to policyholders with clean records.

The Registry of Motor Vehicles (RMV) rather than its new Merit Rating Board (MRB) division will be the controller of the computer-based information system that is crucial to the successful operation of the merit system, Robert Cappiccelli, MRB director, explained.

At a formal MRB meeting late last week, it was decided to use the RMV's Control Data Corp. 3300 system. The machine's I/O capacity will probably be upgraded to handle the load.

If everything goes as smoothly as possible, the information system containing the names and driving records of the state's 4 million licensed drivers and 2.5 million policyholders in this mandatory-insurance state will be on-time, Cappiccelli indicated.

But time, he said, is the biggest obstacle confronting successful development of the registry's file.

Insurance companies and the RMV must also work together, to develop the information system from their own completely different organization methods — policyholders vs. licensed drivers.

These efforts will place great demands not only on the RMV DP department, but also on the insurance companies' current processing loads and staffs, according to industry observers.

Other problems demanding solutions will be which agency will be given control of the information system and whether the extra load of an "enormous data base" should be placed on the RMV's Control Data Corp. batch-oriented 3300 system or on a newer machine dedicated to the merit rating task, according to Cappiccelli.

The insurance industry said it had wanted a machine "such as" an IBM 370/158 to handle the information.

The system used for merit rating processing will have to hold identifiers for all of the state's licensed drivers and policyholders.

Cappiccelli said he expects an average equivalent of one inquiry per year for each licensed driver, or about 35,000 inquiries per day.

Potentially Bad Position

The MRB has been manually compiling data on drivers with moving violations. It then assigns the surcharges and answers public and agent inquiries.

This organization could be in a very bad position for two different reasons since the RMV system is to be used, Cappiccelli said.

First, the 3300 was designed to be a batch-oriented number cruncher rather than a batch inquiry/response machine, he said, adding "its software and hardware are both obsolete and the I/O capability is weak."

Secondly, the MRB could be besieged if the RMV assigns a higher priority to its own processing tasks, which Cappiccelli indicated would be a logical decision made by any DP manager if the processing load is heavy.

On July 1, the state's insurance companies will be required by the Merit Rating Law to begin mailing the surcharge notices to motorists convicted of violations — information which must initially come from the state.

Regardless of that decision, the merit rating program may not accomplish the job for which it was designed.

According to sources here, the surcharged amounts totaled in an insurance company pool may only amount to a $5 bonus per driver by the time it is equally divided among the state's policyholders with clean records.

Meanwhile, the processing costs for the information system will cost each taxpayer in the state between 34 cents and 46 cents per policyholder annually, Cappiccelli stated.

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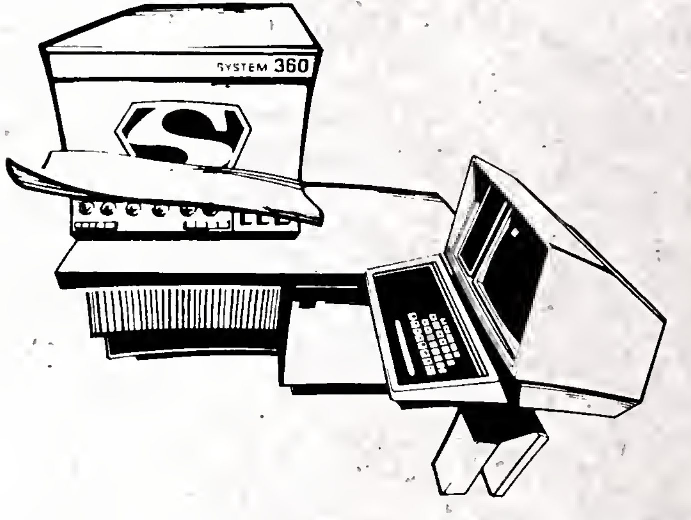

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'Target' Unlikely to Get Funding

(Continued from Page 1)

monthly compensation, pension and education (CP&E) payments.

The system would consist of a main computer center in Hines, Ill., three regional computer centers in Philadelphia, Chicago and Los Angeles and 79 minicomputers and 2,500 terminals in 56 regional VA offices around the country.

The upgraded processing system would enable veterans inquiring about benefits to have their claims calculated much more quickly, the administration's cost/benefit analysis maintained. Checks could be issued in days instead of weeks.

The VA's present claims processing system, installed in the late '50s for the CP&E program, is "technically limited, people intensive and paper bound," according to the administration's third Target cost/benefit analysis which was completed in February.

This system failed last year, resulting in the delay of 647,000 checks to veterans, the administration claimed.

Despite difficulties with the old system, the GAO is not convinced the new one will be much of a solution.

"The VA has not demonstrated a total planning approach to Target implementation," the GAO draft report charged. The administration has also failed to plan completely for those areas of the system it chose to address while consistently underestimating costs.

Among the missing resources the VA needs to make Target work is project management, the GAO said.

In asking the VA to draw up its latest cost/benefit analysis of Target, the House Appropriations Committee said last year that Target should be justified by improved efficiency and lower costs.

The VA's February analysis did not address the committee's additional request that the administration coordinate its planning for Target with its other computer needs.

In addition, the analysis failed to satisfy congressional concern that alternatives to Target — like upgrading the Hines Center —be considered by the VA.

Burroughs and Honeywell were the only firms who put bids in for the Target job. IBM refused the business on the grounds that the system's design is so rigid, the latest and best technology cannot be used.

In its "no-bid" letter to the General Services Administration, IBM also said the proposed system could cost far more than the VA had projected and would not be operational by fiscal year 1979 as planned.

In its letter, the corporation commented on the proposed privacy and security safeguard for Target.

"In complying with requirements on privacy and security, the (design) avoids defining a requirement other than limiting minimums such as a 'password protect' and 'memory protect.'

"The problems of limiting access to privileged information with a data base system are far more complex," IBM wrote.

"The VA . . . seems to place the responsibility for protection on the application programmer. We question the wisdom of such approach," IBM said.

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To Pick Station's Location

Wichita Fire Fighters Put the CPU After the Horse

WICHITA, Kan. — Cities once located fire stations 20 blocks apart because a distance of 10 blocks was as far as a horse could run pulling a fire wagon.

Even with today's combustion-driven vehicles, the same principle prevails: No fire station should be more than four minutes from the scene of a fire.

But there are many more decisions involved in locating fire stations, building them and then maximizing resources for day-to-day operations. So Wichita has turned to its IBM 370/155 computer for assistance, according to Capt. Ellis D. Ingle.

Fire officials have also used the 370 to pinpoint areas in which 70% of fires occur to help inspectors and fire fighters determine where to concentrate education of property owners on fire prevention.

As a result, the fire department reduced inspection teams from 29 to 11, saving over 50% on the miles driven on inspection tours.

In addition, the system maintains a list of about 400 invalids who are confined to their homes. In the event of a fire, a dispatcher can check the address and notify fire fighters en route if an invalid lives there.

The system also has helped determine how many fire fighters and which equipment to put in a station based on specific fire hazards, such as industrial plants and hospitals, in a given area.

Planning Fire Stations

In planning fire stations, the department's analysts studied fire records and data on the city's projected growth by 1980 and 1990 stored in the computer.

Wichita had planned five new stations without a computer analysis during the 1970s at a cost of several million dollars. After its study, the fire department decided to relocate two stations, construct two new stations and transfer three existing companies to man them.

"One site was backed up against a flood control ditch, and there wasn't any fast way to get over it," according to Ingle, who helped develop the site location plan."We must be able to go in any direction in minutes, so the road network around a station is important."

However, "that doesn't mean fire stations should be located near expressways. If there is an accident on a limited-access road, a truck couldn't get around it.

"Speed is important in reaching an emergency, but it's just one consideration. We're encouraged not to go more than 10 miles per hour over the speed limit on a call. If the stations are properly located, trucks can get there quickly and safely," he noted.

Planners study growth patterns, existing and planned roads and how fast any three stations could rspond to a fire. They evaluate traffic conditions, alternate routes to fires, natural barriers (rivers) and man-made obstacles (railroad crossings).

The Wichita fire department also uses the computer to:

- Evaluate responses to alarms by collecting information through the Uniform Fire Incident Reporting System. This system helps Wichita compare performance with other fire departments.
- Schedule building inspections. Inspectors use printed forms to record the property they inspected and when; any hazards they found; and what they did about those hazards.
- Geographically locate all water hydrants and maintain a master file by type, main size and flow. The system schedules inspections twice a year and maintains a file on maintenance requirements.

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HEW Funds Data Base to Back Hotline on Community Education

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The Department of Health, Education and Welfare (HEW) has earmarked $146,000 to fund a federal community education clearinghouse, according to the agency's Office of Education.

The creation of the clearinghouse, which will be based on a computerized data bank, is part of the 1974 Community Schools Act, which calls for such an organization to gather and disseminate information received for community education programs.

This would include information regarding new programs, methods to encourage community participation and ways for coordinating community education programs with other community services.

Informatics, Inc. has received the one-year contract to design and operate the clearinghouse through the Office of Education's Community Education Program, a spokesman for HEW said.

The main service provided to users of the clearinghouse will be a toll-free hotline. Community questions will be answered based on the information collected and maintained in the data bank, according to Molly Wolfe, the project's director.

Clearinghouse office staffs will search the data bank manually for answers to questions; the project is not yet sufficiently funded to provide users with direct access to the data via terminals, Wolfe said.

The collection of community education materials, estimated to be in the neighborhood of 2,000 documents, will be Informatics' main concern for the next three months, she stated. The firm will call on community centers and state education agencies to help assemble this data.

The clearinghouse will be a response/-referral service linking people requesting information with the appropriate resources around the country, Wolfe explained. Users will be provided with a catalog listing all the resource material available in the data bank including an expanded annotation of each item.

Users can either write or phone for specific information. Regularly scheduled meetings will be held with community educators under the auspices of the clearinghouse to ensure the service continues to be responsive to their needs, Wolfe stated.

The services data bank will be contained in the computer system of the National Institutes of Health (NIH).

Community education is a program that uses public school facilities for educational, recreational, cultural and social activities for the community at large. Each program varies considerably depending on the needs, interests and concerns of the community it serves, the HEW spokesman explained.

At the federal level, community education is funded under the Special Projects Act of the Education Amendments of 1974. Awards amounting to $3.5 million were made for the first time during the 1976-77 school year to state and local education agencies and institutions of higher education, he added.

Seven From Bell Labs Named IEEE Fellows

MURRAY HILL, N.J. — Seven engineers and scientists from Bell Laboratories have been elected Fellows of the Institue of Electrical and Electronics Engineers (IEEE).

The honor, confirmed by IEEE's board of directors, recognizes people with "demonstrated outstanding and extraordinary qualifications and experience" who have made important contributions to the profession.

Those honored include Mauro DiDomenico Jr., who heads the Lightwave Devices and Subsystems Department here; Richard W. Dixon, supervisor of the Gallium Arsenide Communications Lasers Group here; and Ernest R. Kretzmer, director of the Data Communications Technology and Applications Laboratory at Holmdel, N.J.

Also, G. Lorimer Miller, a member of the Radiation Physics Research Department here; Bernard T. Murphy, who heads the Integrated Circuit Design Department here; David G. Thomas, executive director of the Transmission Systems-Holmdel Division; and Fred D. Waldhauer, supervisor of the Fiberguide Applications Group at Holmdel.

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Badge Readers, Phone Switcher Tied

French Firm Accused of Using DP to Spy on Workers

PARIS — A computer-based telephone switching system tied to a badge reader spied on DP employees at an insurance company here — even noting when they went to the bathroom, according to a recent Associated Press (AP) wire story.

The IBM system was installed last year in a six-story building owned by Assurances Generales de France as a means of boosting productivity. Since then, it has come under strong criticism from the French Confederation of Democratic Workers (CFDT), French newspapers and news magazines, the AP said.

Neither IBM nor the machine, an IBM 3750 CPU available in Europe for about $240,000, can be blamed for the way someone else uses it, the American computer vendor told the AP.

The device stores up to 100 telephone numbers, reduces dialing to three digits, records call times and destinations and performs other communications dollar-saving functions, AP said.

But the insurance company also brought in badge readers, according to labor union president Gerard Lobjeoie. The company placed them next to about 70 doors and removed the door knobs, forcing employees to use their badges to enter or leave the data center's rooms, Lobjeoie said.

"This information was relayed to a computer, which kept a record of who opened what door and at what time, so the company could keep track of employees throughout the day, spying on their comings and goings.

"In effect, it even knew when you were going to the toilet," Lobjeoie said.

Assurances Generales de France will not talk publicly about the criticism from the CFDT and the French press, AP said.

When the union discovered what was happening at the data center, it took the information to *L'Express, Le Nouvel Observateur* and Communist-party, leftist and satirical newspapers and magazines, Lobjeoie said.

Le Nouvel Observateur, a weekly newsmagazine, ran an article headlined "James Bond in the Office" that said the machine "keeps merciless accounts of all pauses, justified and unjustified, before the coffee machine, in the toilets on the upper floors, even in front of bulletin boards."

The publication claimed 50 French firms are using the computer-based devices.

Assurances' management agreed to replace the badge readers with "electric eyes" to open and close doors as a result of the union and media pressure, Lobjeoie said.

DP Auditors 'Not Police': Mair

By Frank Vaughan
Of the CW Staff

NEWTON, Mass. — "DP auditors are not and cannot be policemen," William C. Mair, coauthor of *Computer Control and Audit*, told the New England Chapter of the EDP Auditors Association, Inc. here recently.

The primary responsibility of an auditor is to act as an advisor to management, he suggested, emphasizing the need for standards which must be properly documented and properly communicated.

"Standards are the foundations upon which everything else is built," the author noted. These basic foundations provide three major benefits: direction, predictability and criteria for evaluation.

One of the primary areas of concern for DP auditors is establishing systems controls. In fact, a DP auditor is actually a control, Mair indicated, explaining "controls are anything that tends to reduce adverse effects."

These controls are needed to reduce the number of exposures, or vulnerable areas, a company has. Exposures do not simply arise because controls are lacking; they are the result of a number of factors, he said. Controls act to reduce or to eliminate them.

Before controls can be evaluated in any context, auditors must identify the exposures which controls should prevent, detect or identify. Exposures that businesses commonly encounter include erroneous management decisions, fraud and embezzlement, statutory sanctions, excessive costs and deficient revenues, loss or destruction of assets and competitive disadvantage.

In relating the controls to the exposures, auditors should ask the simple question: Is it likely to happen, yes or no? Of course, that alone is not enough, Mair said.

Additionally, a rational and reviewable structure for predicting the reliability of controls is needed, he indicated.

In order to establish this structure, auditors have to test the controls in light of real world conditions. Other steps include setting objectives; basic and detailed information gathering; evaluating the structure's strengths and weaknesses; design testing, performance testing and evaluating the results.

Each process must be marked with audit documentation, he said, because review is the heart of documentation.

Grosch, Rose to Talk At Productivity Meet

WASHINGTON, D.C. — Dr. H.R.J. Grosch, president of the Association for Computing Machinery, and Rep. Charles Rose, who chairs the House of Representatives Policy Group on Information and Computers, will be the featured speakers at the National Conference on Computer Systems Productivity here June 27-29.

Sponsored jointly by *Government Executive*, a monthly magazine aimed at federal, state and local government adminstrators, and the Capitol Area Chapter of the Society for Management Information Systems, the conference is aimed at improving the efficiency of DP operations.

The emphasis of the conference extends beyond the machine room to the entire application development process.

More information is available from the conference manager, the Institute for Professional Education, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209.

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The Waves of Change

By Charles P. Lecht

With this installment, Computerworld *continues excerpting* The Waves of Changes, *a soon-to-be-published book by Charles P. Lecht, president of Advanced Computer Techniques Corp. This week Lecht explores the changing relationship between software and hardware and makes some predictions about the coming 'System 80' era.*

CHAPTER II

In the past, many — perhaps most — observers of the computer field tended to overrate new hardware technological developments as a factor in projecting and assessing the future of the computer industry.

Today, however, state-of-the-art techniques in systems software design are emerging as the competitive master key to unlocking new applications developments and installation growth, especially in the medium- to large-scale area. The major manufacturers' growing recognition of this situation (and its economic ramifications) may explain why the lines between suppliers of computer hardware, software and system services are blurring.

This sort of competitive "overlap" is becoming the rule today not only because of profit opportunities for the vendors (although this must always be assumed to be a key factor); it also reflects the vendors' conscious effort to accommodate changes in priorities of users who are becoming aware, in ever greater numbers, of the importance of software in their systems selection decisions.

This shift in priorities, which is giving the edge to vendors whose software makes their hardware easier to use, maintain and operate, is coming about for the following reasons:

- Applications software development continues to be expensive. Even a relatively mundane applications development effort, such as the creation of a typical 20,000-instruction payroll package, currently costs close to $160,000 (up from about $90,000 in 1959, if anyone remembers back that far).

In addition, the annual "maintenance" cost for changing applications software modules because of revisions in tax structures, state and local laws and other factors is a major dollar consideration.

- Basic software costs are steadily outpacing those for hardware. Figure II-1 illustrates the general trend of software costs as rising to over 80% of the total hardware/software package over the next 10 years; Figure II-2 shows real-life examples of the DP budgets of two of the nation's important computer customers, the U.S. Army and the U.S. Air Force.

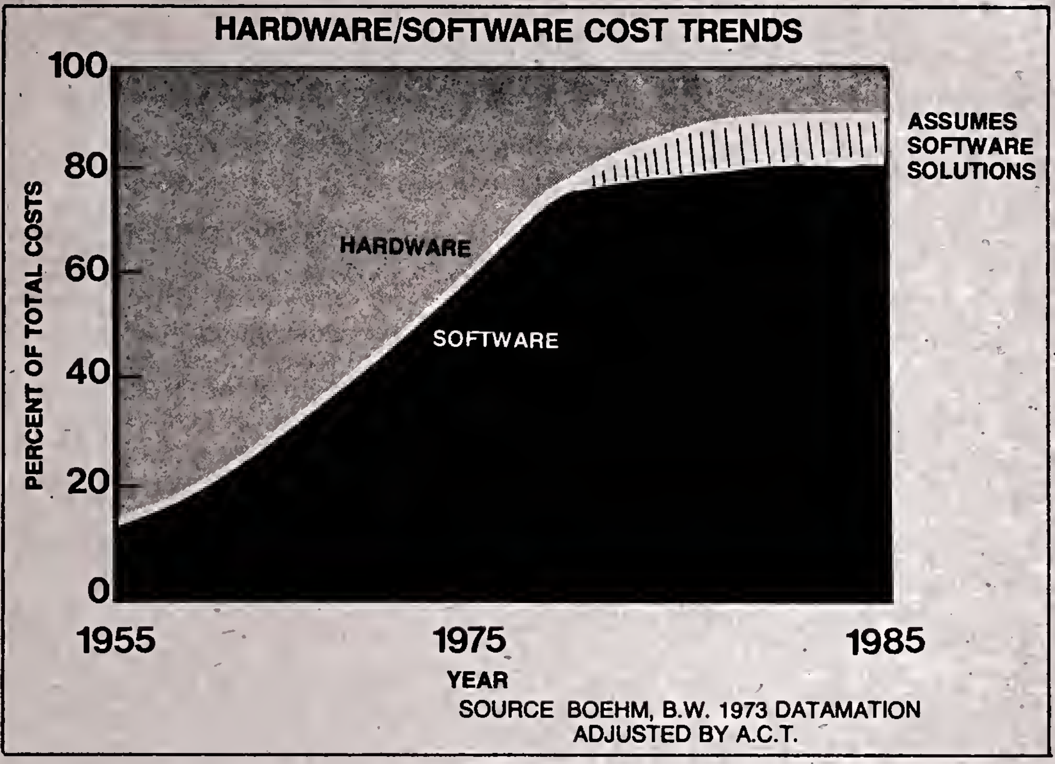
The latter's software expenditures were projected to exceed $1.25 billion, while hardware expenditures were less than $500 million, nearly a 2.5:1 ratio of software over hardware. Currently, total Defense Department R&D software expenditures are about eight times the hardware costs, according to Dr. Eugene Fubini.

Too much hardware preoccupation on the part of computer systems vendors/users has created a situation not unlike that faced by would-be supersonic aircraft users. However short their actual flight may be, the door-to-door travel time can net out to be longer than they experience with older technology more conveniently located.

Improper allocations of personnel, time and funds to software development in the past sowed the seeds of a malignant contradiction in our creation of an accelerating hardware technology: longer net times to applications implementation with souped-up hardware.

A recent study of future user software requirements by a major user organization (Guide Futures Division, 1975) revealed the following five, not too surprising, facts:

1. Corporate management in most companies wants the ability to predict time, cost and performance of a software project prior to the decision to establish that project.
2. Shorter system and program development cycles are needed to cut down the time required to progress from applications planning to implementation and operation.
3. The vendor must make it easier for the user to make changes in applications packages.
4. Easier access to data is desired, making it possible for management to extract data and reports from the system without going through DP operations.
5. Users want freedom of output choices, e.g., the ability to use a display or hard-copy printer, microfiche or any other output media.



SOURCE BOEHM, B.W. 1973 DATAMATION
ADJUSTED BY A.C.T.

Figure II-I

All five of these points reflect a desire for increased responsiveness from today's DP environment, the frustration felt by management as a result of the inflexibility of today's complex systems and/or the high degree (and cost) of technical talent required to overcome such inflexibility.

This user report concluded "that the current data processing facilities represent a bottleneck. Services are constrained by the limited capacity of the DP facilities. Present applications systems are too complex, too inflexible and completely out of control in respect to the purpose for which they were created: to serve the organization. Too many personnel seem to look upon data processing as an *end within itself.*"

A DP Charter

The primary mission of DP is to create the proper *procedural environment* for the continued orderly regeneration of the corporation's *operational environment* as it pertains to:

- The acquisition, purification, storage, processing, retrieval, presentation and dissemination of information for management at all levels.
- The creation of organic harmony in the integration of man/machine systems into the day-to-day affairs of the corporation.

DP's primary mission must be supportive of, subservient to and embedded in the overall management plans, procedures and objectives established by the corporate operating committee. Its role in the corporate environment is unique in that:

- Except in the area of administration of its own affairs, it cannot create a "product" to be delivered to the corporation without dynamic and day-to-day participation by the various corporate suborganizations which the product is to serve.
- Its success is measured in terms of the proliferation of its capabilities throughout the corporation and the ultimate loss of its own identity as an independent corporate suborganization.

Coexisting with the broad objectives outlined above are those bearing on DP's role in providing guidance in the allocation of funds to be invested in DP resources, including computer systems, communications systems, etc.

In doing this, it is required to achieve a proper, timely and "in context" capability to ascertain the technical, political, psychological and financial impact of the use of DP systems in support of the corporation's information-processing requirements, as explicitly directed and/or implicitly inferred by the corporation's operating committee, as well as by its designated authorities.

DP will prepare and maintain the corporate information systems charter to include long-range objectives, each defined as the outgrowth of a set of short-range accomplishments.

Also, in recognition of the current state of the art in computer systems usage technology, DP will prepare and maintain its own operational procedures and standards to serve as an "in-flight guidance system" to ease the transition from systems of the past to those of the future in an atmosphere of realism dedicated to fulfilling the urgent needs of the present.

In 1965, I prepared as short a statement of the mission of corporate DP organization as I could. Over 10 years later this charter, shown at the left, seems more relevant than ever.

If one agrees with the charter, the Guide conclusions of 1975 are indeed sad ones which, in fact, might have been reached at any time during the past 25 years. *While not the only reason, software insufficiency alone would have assured this!*

Only recently have the hardware vendors addressed themselves to solving the basic software situation. Language facilities are rapidly changing from the rigidly intellectual symbol manipulation games of the '50s and '60s to the more natural industrial and/or functional "lingos" of individual disciplinary areas.

Quasinatural language compilers, data base management systems and the like will eliminate the need to maintain the costly activity of the computer programmer as we now know it — Cobolaholics, beware!

By the end of this decade, we anticipate that future systems architecture from IBM, Honeywell, Univac, Burroughs, NCR and others will be more supportive of DP's primary mission as given in the charter. Such factors as ease of usage, end-user effectiveness, adaptability and functional capability will be the basis of the success of these systems.

By ease of usage, we mean that their architecture will aid the development of simple, easily used quasinatural languages. This is of paramount importance to each of the various user classes.

For example, one form of a given language might be more suitable to a doctor, a teacher, a lawyer, an engineer or a scientist, while still another form of the same language might be appropriate for managers, accountants, security analysts and so forth.

Future user languages will optimize the human resource as well as its hardware counterpart. At the beginning, this will be achieved at the expense of machine cycle time, storage space and other hardware resources. Later, both software and hardware will operate as a unified and synergistic entity, a very worthwhile goal indeed in view of today's trade-offs between the two.

The successful systems vendor must ensure that the "human engineering" question is answered through provision of more human-like language facilities, as well as those of a physical nature. Fortunately, some manufacturers are currently working on this.

For example, Honeywell's TDS/IDS within a Cobol envelope has placed incredible transaction processing/data manipulation power in the hands of its users — eliminating their need to write thousands of lines of code to achieve comparable facilities. Burroughs has been designing its processors with user language facilities in mind.

Both seem to have proven that a few talented people can be more productive in developing advanced applications and/or systems control software with carefully thought-out software (in the first case) and hardware (in the second).

Currently, software is costly not only to develop, but also to maintain for both the manufacturer and the user. There can be very little market opportunity for new computer systems if users are unable to use them easily, no matter how sophisticated their internal hardware features may be.

An IBM-sponsored survey of over 160 selected customers in Europe, the U.S. and Japan had as its primary objective the identification of the key inhibitors to applications growth in the worldwide computer industry. Just looking at the U.S. alone, the results showed that manpower inadequacy — that is, the lack of sufficient numbers of adequately trained programmers and analysts — was the No.1 inhibitor.

The growing data base and data communications application complexity problem was second, while operations complexity was third.

If current computer industry manpower statistics are to be believed, the only reasonable solution to the dearth-of-talent problem is to pack more "intelligence" into future systems offerings (in the U.S.) or else the market may stagnate and, at best, not grow as rapidly in the late 1970s and early '80s.

Manufacturers in or entering the U.S. marketplace: Beware! It is evident that

(Continued on Page 14)

A Glance Into *The Waves of Change*

(Continued from Page 13)

those vendors who do not "tune in" to this bottom line fact in the latter part of this decade will fail.

Advances Lacking

While hardware performance and capacity are growing rapidly because of advances in technology, they are also growing faster than the ability of the current user population to employ them effectively because of lack of advance in software technology.

If current trends continue, by 1980 it is estimated that over 80% of the computer user's total human resources — programmers and systems analysts — will be devoted to the maintenance of old application programs, with less than 20% of these resources available for new applications development.

Without new applications development, the U.S. systems market will surely stagnate (see Figure II-4).

Computer users have changed, both through systematic education and simple, general exposure to three or four generations of hardware and software. Today, even first-time users have considerable awareness of the computer system's capabilities and limitations.

Getting the right machine is relatively easy today; getting the right software with which to do the job effectively is much more difficult. Thus, clients are looking more and more toward software for significant breakthroughs in efficient and effective systems utilization.

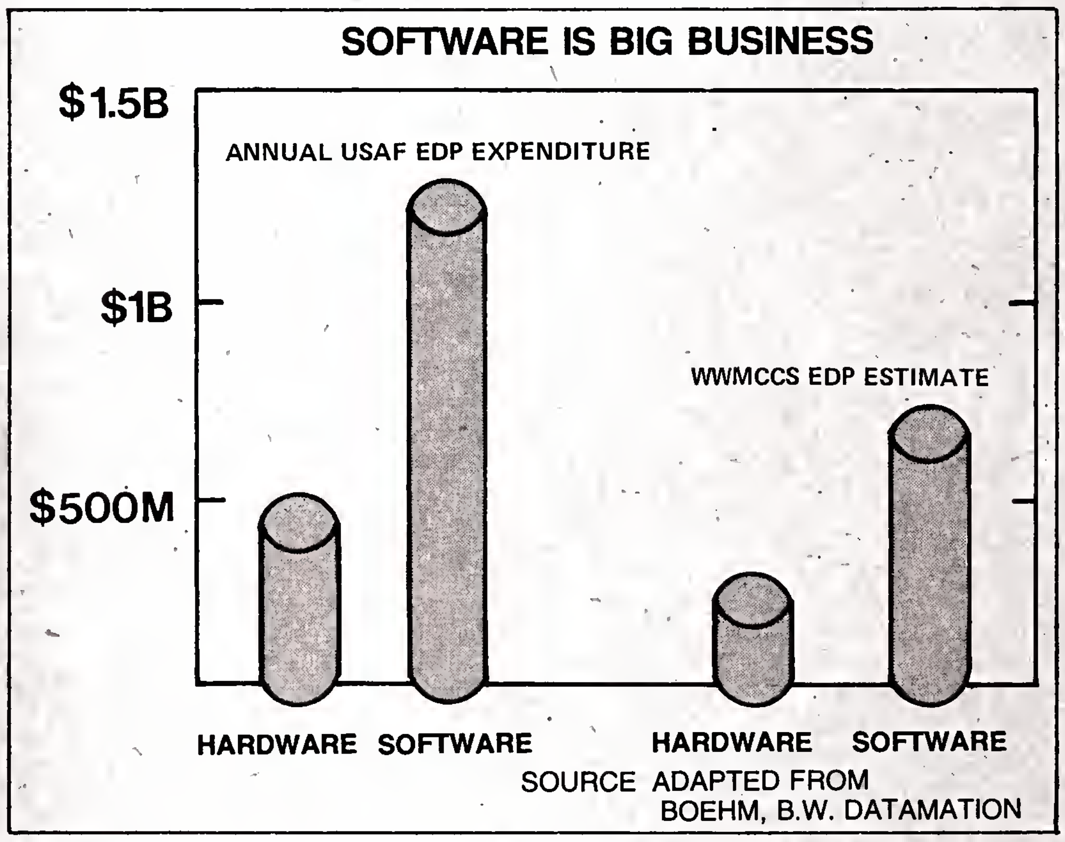
Changing Responsibilities

Another indication of how concerned the user is with software ease of usage for new applications development is provided by the shifting pattern in assignment of internal DP responsibilities. This shift began in the mid-'60s with the formation of project management teams composed of DP personnel and end-user department personnel to design advanced applications systems.

At first, the project team manager came from the DP shop. Since 1970, however, he or she has, with increasing frequency, come from the end-user organization.

This trend partly shows that the DP organization has not been responsive enough to its clients' real needs and that client mistrust (with or without legitimate reasons) is manifest everywhere. It also shows that newly emerging software facilities as well as migration of personnel out of the DP center and into corporate subentities are lessening the need for non-DP management to deal with technology per se.

In the past, many user organizations solved software inadequacy problems by acquiring more hardware. It was both easy and tempting for computer manufacturers merely to extend existing architectures through large-scale integration (LSI) and other advanced packaging techniques. But such extension and creation of LSI versions of existing products will not be adequate in the 1980s.



SOURCE ADAPTED FROM BOEHM, B.W. DATAMATION

Figure II-2

Today, this temptation still exists because one can easily demonstrate that any machine with LSI can be enhanced to achieve three to five times greater CPU performance (measured in terms of millions of instructions executed per second). However, yielding to this temptation in today's swiftly changing, increasingly competitive marketplace is dangerous to the manufacturer, not to mention the user.

The policy of extending an existing product line without making radical changes in how it is to be used is, strangely, self-defeating. IBM (we assume) learned this lesson in the early 1970s when it was just starting to install 370s: The recession caused many users to consolidate their multiple medium-scale 360s into one larger 370. The resultant revenue impact on IBM was serious.

Today, no smart manufacturer introduces more powerful systems before users can effectively absorb the extra power.

The reverse is also true; i.e., manufacturers must provide adequate growth paths for their customer bases in terms of increased performance and capacity if they are to retain their clientele. Thus new product announcement policies must seek to achieve a delicate balance between old product payback/old customer retention factors.

Operating System Trends

While we wait breathlessly for something new and different — something which will provide a breakthrough for the user, relieving him of the need to maintain "airplane mechanics" in order to take a routine flight — let's see what's happening.

IBM's new Multiple Virtual Storage (MVS) operating system emerges as the key software which, together with Virtual Machine 370 (VM/370), will serve as the bridge for users migrating to System/80 in the latter part of this decade.

Other bridging vehicles include System Network Architecture (SNA), Synchronous Data Link Control (SDLC), the Virtual Storage Access Method (Vsam) and Data Language/1 (DL/1).

With MVS, IBM has developed a modular operating system which will permit future users to select only the software components required to meet the needs of their particular installation. It is highly probable that some future version of MVS (Release 4?) will be unbundled on a module basis so users may choose specific functions and pay only for the corresponding elements.

This new, "selectable unit" (SU), modular packaging concept was formally announced by IBM in May 1976, although it can also be seen as an affirmation and continuation of a trend to unbundling and separate pricing of system control programming modules which began with IBM's offering of a separately priced VM/370 RPQ package for $850 per month.

A more recent development was the introduction in July 1976 of an SU module for MVS called RACF, which offers significantly enhanced data security at a price of $875 per month. To date, over a dozen such SUs have been introduced.

Packaging Technique

An SU is a packaging technique, a software module which represents a performance and/or functional enhancement to the base release of MVS. Formerly, if customers requested a single, new functional or performance enhancement, they had to wait and convert to the next major release of the operating system which, in turn, often contained features many users didn't really need.

With SU, IBM has provided the means for avoiding unnecessarily massive changeovers, since the customer can select only those modules which are truly essential to his needs. Although the SU concept has been announced only for MVS, IBM's top-of-the-line operating system, it is inevitable that this approach will spread to other systems as well.

In fact, we anticipate the low-end DOS/-VS operating system will eventually be discontinued or put in maintenance mode by IBM as it gradually migrates its customer base to MVS, SVS or VM/370.

The advantages of this flexible software packaging approach are many. For one thing, the new SU scheme crystalizes the interfaces between different functional components of the operating system, which should improve future compatibility and adaptability with System/80. Also, the modular approach facilitates problem isolation and generally improves the stability of the software from the standpoint of maintenance.

SU packaging gives IBM greater management control over timing of new functional introductions and performance improvements as well.

Moreover, the SU modular approach gives IBM considerably more flexibility in regard to the rate at which it can increase price levels for future extensions or improvements to the operating systems. As additional functions are made available for MVS, SVS or VM/370, a new system pricing structure can be instituted over the long term whereby hardware prices will be reduced in near-direct proportion to the

(Continued on Page 15)

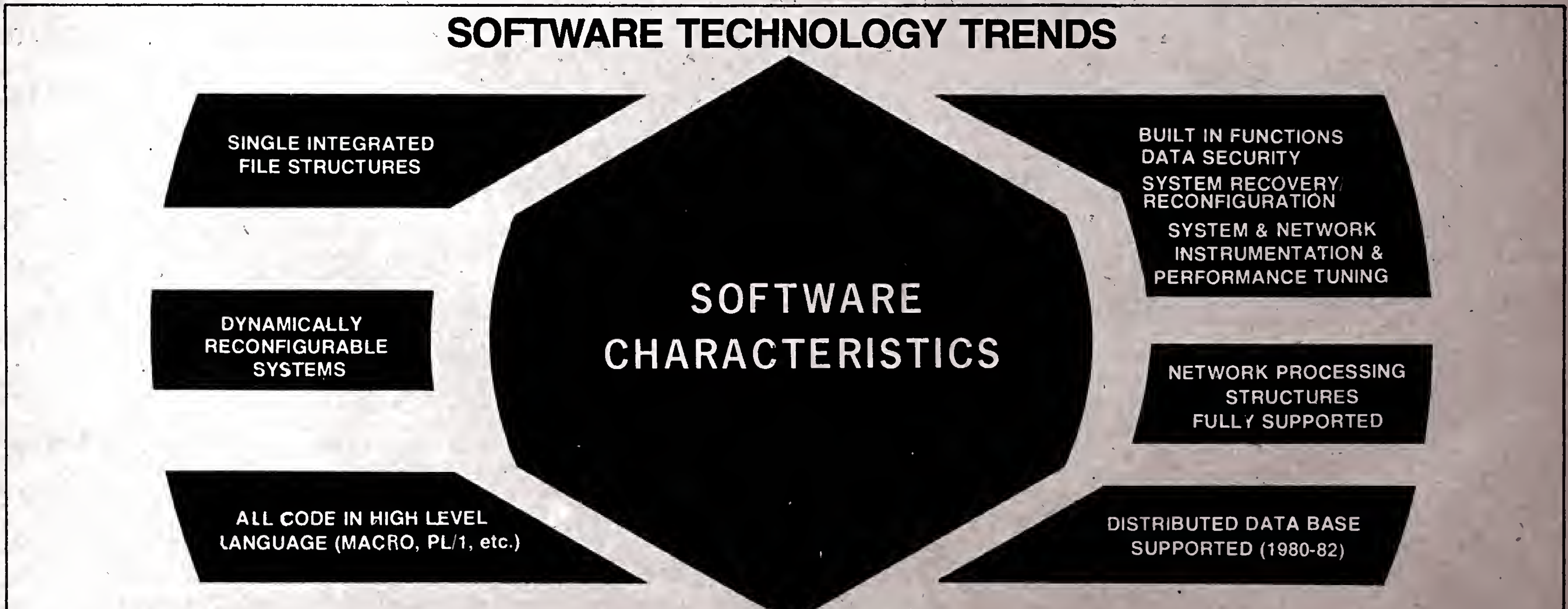

SOFTWARE TECHNOLOGY TRENDS
SOFTWARE CHARACTERISTICS
SINGLE INTEGRATED FILE STRUCTURES
DYNAMICALLY RECONFIGURABLE SYSTEMS
ALL CODE IN HIGH LEVEL LANGUAGE (MACRO, PL/1, etc.)
BUILT IN FUNCTIONS
DATA SECURITY
SYSTEM RECOVERY RECONFIGURATION
SYSTEM & NETWORK INSTRUMENTATION & PERFORMANCE TUNING
NETWORK PROCESSING STRUCTURES FULLY SUPPORTED
DISTRIBUTED DATA BASE SUPPORTED (1980-82)

Figure II-3

A Soon-to-Be-Published Book by Charles P. Lecht

(Continued from Page 14)

software price increases (value-added pricing).

The SU modular approach has implications for IBM's next generation of mainframes (which for lack of a better name we've been calling System/80). The original features of the new system software for "System Q," as it was called in the Telex documents (trial documents which contained many IBM internal planning papers), included substantial *modularity* and an introduction date of approximately 1976. Furthermore, "System Q" announcements were slated to be gradual, just like the SU concept.

When System/80 is introduced, a large number of new SUs can be expected, elevating the software pricing level for those users who wish to take advantage of the new hardware capability. Simultaneously, we can expect hardware finally to reflect the pricing of software by not carrying the burden of software development costs.

Thus, the new generation will be much more competitive at the hardware level than ever before and *the user's costs will shift more and more toward microcode and software.* The SU approach allows IBM to phase in a system control pricing strategy on a highly controlled basis. There is significant evidence even today that SUs are in fact the prelude to separate pricing.

Unbundling Leaders

Other manufacturers have really led the way in the areas of operating system unbundling. Control Data Corp. operating systems have been unbundled for over five years.

With the recent introduction of the NCR Criterion line, that company announced that it, too, would unbundle its operating systems: "With software costs constituting an ever greater portion of the cost of the system, it is unacceptable to charge the same proportion of software development cost to each user regardless of the amount of software he is actually using. Now each user will pay for as much as he uses."

Moreover, the Burroughs 80 series (a small-scale system) Master Control Program is also unbundled. The SU pricing trend is thus not new.

Why would IBM unbundle its major operating systems at this time? Recent reports from Japan state that Fujitsu has obtained more than 40 orders for the M190 computer and a dozen orders for the M180-II, while Amdahl Corp. has secured at least 30 orders for the 470V/6, including three orders from AT&T.

Furthermore, semiconductor firms in collaboration with other major vendors or leasing companies (e.g., National Semiconductor and Itel) are beginning to market IBM plug-compatible mainframes which use and depend on IBM-developed operating systems software.

Therefore, if IBM has to yield on the relative profitability of its large-scale business because of competition from the plug-compatible mainframers, it will almost certainly place increased value on separately priced systems software. In other words, the user will see his hardware costs for CPUs, storage, I/O channels and so on decrease sharply over the next several years, but the systems software costs will rise proportionately as the mainframe industry shifts its value-added emphasis from hardware (or firmware) under the pressure of these emerging competitors from Japan and the semiconductor industry.

The end result may be that plug-compatible vendors such as Amdahl, Itel, Fujitsu, Hitachi and CDC may be forced to pay IBM thousands of dollars monthly for selectable units of the operating system used on their equipment (assuming, of course, that they can remain compatible with IBM hardware, microcode and software in the future).

Also, Amdahl's position in particular, in view of its current "piggyback" software mode (piggyback on IBM, that is), may be weakened. Maintaining various versions of various software modules in varying environments may cause its current software support budget to explode.

The IBM SU modular approach may ultimately evolve into a multimodule library offering greater software/microcode optimization or tailoring to suit the user's specific functional and performance requirements. For example, IBM's future systems could be tailored and optimized for particular types of customers (banks, insurance or retail businesses, etc.) and/or applications classes (inventory control, accounting, etc.) via selected microcoded modules.

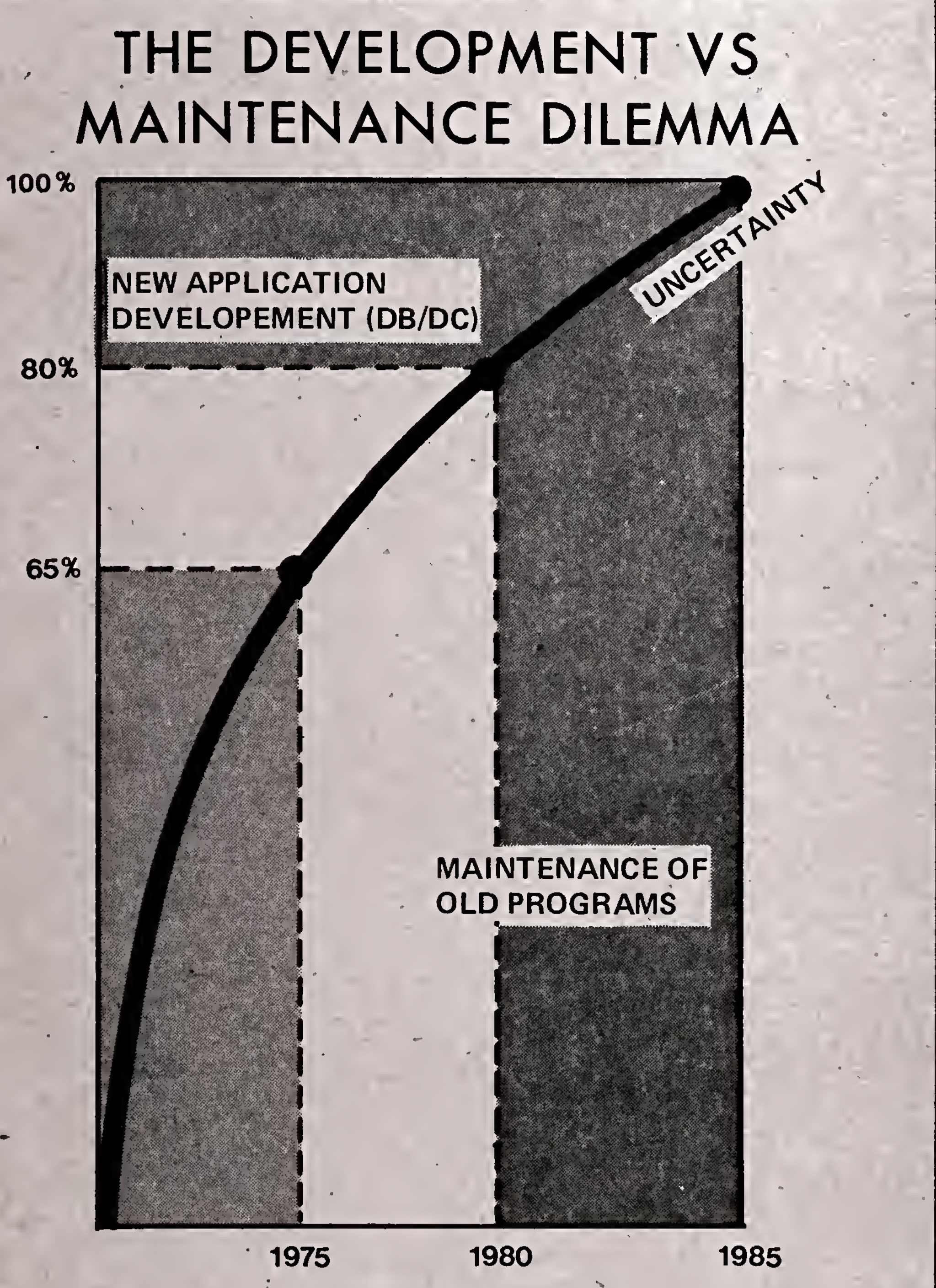
The SU technique may also make it more difficult for plug-compatible mainframers to unhook or convert IBM systems; the IBM customer base will be more fragmented, each customer having a different configuration of hardware and SUs which are *proprietary* to IBM.

In addition this concept, with the proper "microcode lock and key mechanism," may allow IBM to police its unbundling policy to ensure that all users pay their fair share for all systems control programs and program products.

And, finally, during the System/80 era "pluggable firmware modules" may become available, giving IBM greater flexibility and control over hardware, software usage and user performance and, as noted before, a "functional pricing philosophy" may ultimately unfold.

Lecht is the author of four previous books on computer-related matters: The Programmer's Fortran II and IV, The Programmer's Algol, The Programmer's PL/I *and* The Management of Computer Programming Projects.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.



THE DEVELOPMENT VS MAINTENANCE DILEMMA

CONCLUSIONS

- The EDP market may stagnate if current trends continue.
- Hardware performance & Capacity is growing faster than the ability of current customers to use it.

SOURCE A.C.T. ESTIMATES
BASED ON IBM USER SURVEYS

Figure II-4

SOFTWARE TECHNOLOGY TRENDS

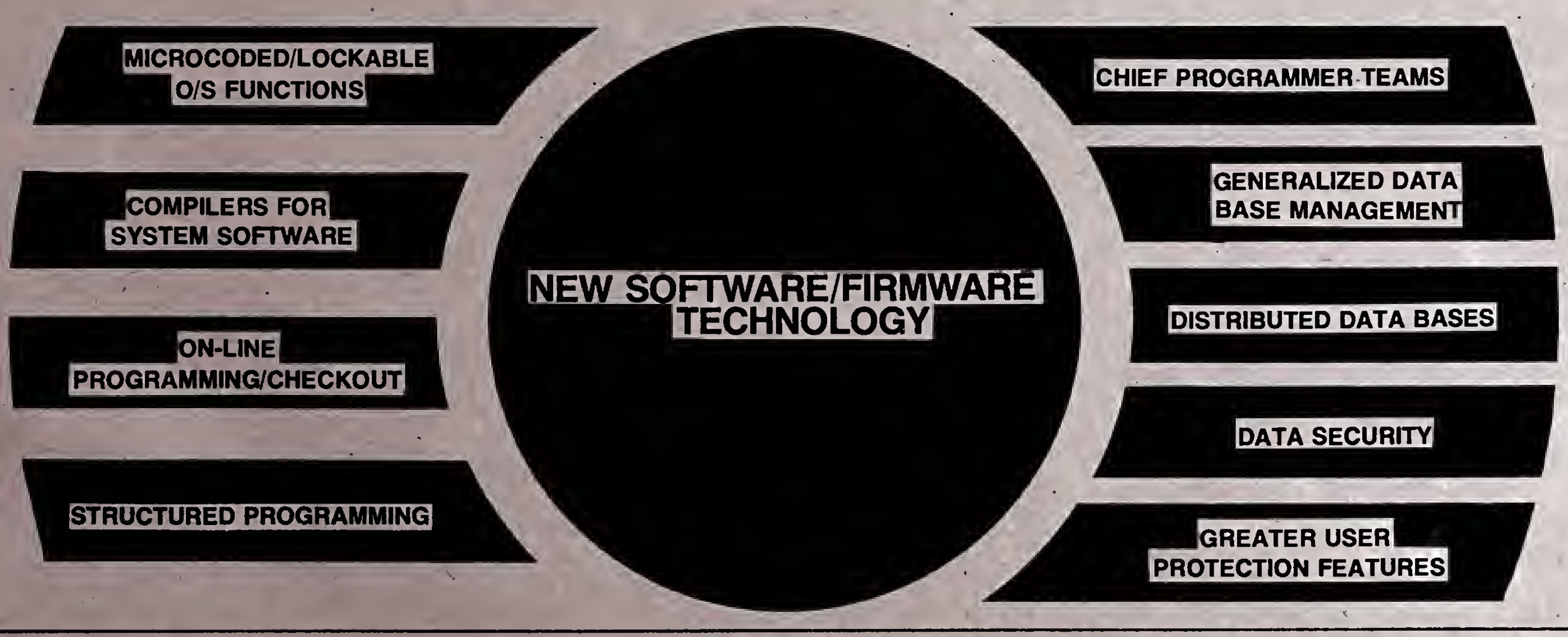


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Figure II-5

DP-Aided Earthquake Study Not Just Monkey Business

By Sandra Katzman
Special to Computerworld

SAN FRANCISCO — The fledgling science of earthquake prediction suffered a loss of face the first week of 1977 when "an accurate quake prediction" in the town of Hollister, Calif., which ran on the front page of San Francisco newspapers, was upstaged the next day by the headline — "Flurry of Eight Quakes Jolts the Bay Area."

Not only had the temblors, or quakes that rocked San Francisco and the East Bay been unpredicted, but the seismograph at the University of California-Berkeley, used to predict quakes here, ran out of ink during the three-hour swarm, or series of quakes. The behemoth was pictured next to the story.

Other instruments recorded the data, but the analogy to the state of the science is instructive.

While an inordinate variety of exhaustive data must be processed and analyzed to predict earthquakes, funds for both governmental and independent study seem poorly channeled and/or unavailable, particularly when things get exciting.

A broad range of study is necessary because earthquake prediction is not yet an exact science.

Even in the famous 1975 Chinese earthquake prediction, no one method announced the quake, but a variety of changes — from water level in wells to the curious behavior of zoo animals — were observed to be simultaneous. A quake was accurately guessed to be imminent.

This country has barely 1/10 the number of seismologists that China has. Anecdotal evidence like that collected by local Red Guard units is also lacking.

Instead, earthquake prediction research here relies heavily on computers — from relatively simple DP to experiments correlating anomolous animal behavior with seismic activity. This is expensive, but allows for innovative and unprecedented work.

Dr. Seymour Levine, of Stanford University, has been studying chimpanzees in cages directly over the San Andreas fault.

"Ours is the first scientific evidence showing a change which has been quantified and scientifically examined," Levine said. "It makes it more credible than someone saying, 'My cow went crazy on that day.' "

Levine has called for a computer system which would allow a constant comparison of chimp behavior on a day-to-day basis to study how animals act as "geosensors."

Submolecular biologists have postulated that energy transfers occur at the electron level within animal cells causing changes in cellular behavior or response — thus explaining how animals know an earthquake is coming.

Some people with specifically developed senses can also be useful in earthquake prediction. One such person is Monica Schaaf, a blind woman, who joined the United States Geological Survey's (USGS) Office of Earthquake Studies (OES) in Menlo Park, Calif., last year.

The first blind student to be graduated in Earth Science, Schaaf is using her keen sense of hearing to help document the relationship between "stress drop and corner frequency shift."

This could be the basis for discriminating foreshocks from aftershocks.

Private Organizations

Several private organizations are participating along with USGS, including Telesensory, Inc., which specializes in sensory-aid transformation from visual to tactile and audio in a variety of formats.

Dr. Darroll Wood of the USGS who heads the audio-seismology study, expressed a common concern in the field of earthquake prediction.

"Though we can get quite exotic with our engineering, we feel that nothing sophisticated will be solicited from our outside supporters until we are better focused on the project," Wood stated in an OES monthly report.

But better focusing depends on more research, which, in turn, depends on more money.

The National Earthquake Information Service, too, is increasing its use of computers. An off-line data entry system has been designed using an upgraded Data General Corp. Nova 1220 which had previously been used for digitizing seismograms.

Extended Earthquake Data Reports will eventually compile seismic data nationwide, with the events listed chronologically on 12 microfiche per quarter.

The Albuquerque Seismological Laboratory (ASL) in New Mexico has been working to implement seismograph stations worldwide.

Sponsored by the Advanced Research Projects Agency, ASL has become involved in the installation of highly advanced digital recording seismograph observatories of several types.

Recent advances in electronics (both digital and analog) and seismic sensor technology have made possible the design, assembly and installation of a new type of seismograph system, the Seismic Research Observatory (SRO), according to ASL.

The SRO's software-controlled digital recording system was developed by Teledyne-Geotech of Garland, Texas.

The recording system was designed and built by Unitech, Inc., of Austin, Texas, and is controlled by a minicomputer.

Computers are also used in USGS efforts to keep a file of earthquake predictions from a variety of sources, including visions, psychic impressions and astrological charts.

Valid predictions are entered into a computer storage and analysis program and later scanned for matches with located earthquakes.

The predictions receive scores based on six bits of information (year, month, day, time, location and size).

The computer can sort the file chronologically or alphabetically.

"Once this program has been in operation for a reasonable time, it will be possible to give some sort of resposne to the remarkably accurate predictions which occur from time to time," according to a USGS spokesman.

Sandra Katzman is a freelance writer specializing in science.

Call for Papers

FIRST INTERNATIONAL COMPUTER SOFTWARE AND APPLICATIONS CONFERENCE (Compsec 77), Chicego, Nov. 8-11, 1977.

Papers ranging in length from 1,000 to 5,000 words are invited to discuss: development methodology, menegement, dete bese menegement systams, transactions end informetion menegement systems, real-time applicetions, decision-making systems, dete communicetions and computer networking, cese studies, computer-eidad design, simuletion, softwara tools, mini/micro software davalopmant, orgenizetionel impect and the sociel end legel issues.

Pepars should be submitted in five copies, double-spacad, by Juna 1 to Dr. Dick B. Simmons, director, DP Canter, Texes A&M University, Collega Stetion, Taxes 77843.

SEVENTH ANNUAL CONFERENCE OF THE ASSOCIATION OF COMPUTER PROGRAMMERS AND ANALYSTS (ACPA), Naw Orlaans, Le., Nov.9-11, 1977.

Pepars should antartein tha theme "It's a Small World" end mey be on eny of tha following ganarel subjects: minicomputers, microprocassors, natworkad minicomputars, distributive processing, microcomputars as communicetions front ends or data basa lengueges for minis.

An ebstrect that does not exceed 150 words should ba includad end the paper should not exeed six typewritten doubla-spaced pegas. Pepers should be sent by July 1 to Gery Shurmen, ACPA VII conference cheirman, 6405 Gladys St., Meteiria, Le. 70003.

Calendar

May 24-26, Urbana, Ill. —**Sixth Annual Symposium on Incremental Motion Control Systems and Devices.** Contact: Bob Schmidt, Gardner, Jones & Co., Inc., 11 E. Wacker Drive, Chicago, Ill. 60601.

May 24-26, Sunnyvale, Calif.— **Semicon/West '77,** sponsored by Semiconductor Equipment & Materials Institute. Contact: Golden Gate Enterprises, Inc., Suite 210, 1307 S. Mary Ave., Sunnyvale, Calif. 94087.

May 24-27, Los Angeles — **Comparative Data Base Management Systems National Conference,** sponsored by UCLA Extension. Contact: Michael Reilly, UCLA Extension, P.O.Box 24902, Los Angeles, Calif. 90024.

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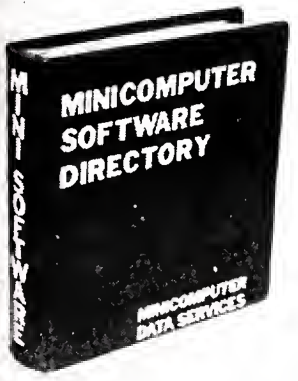

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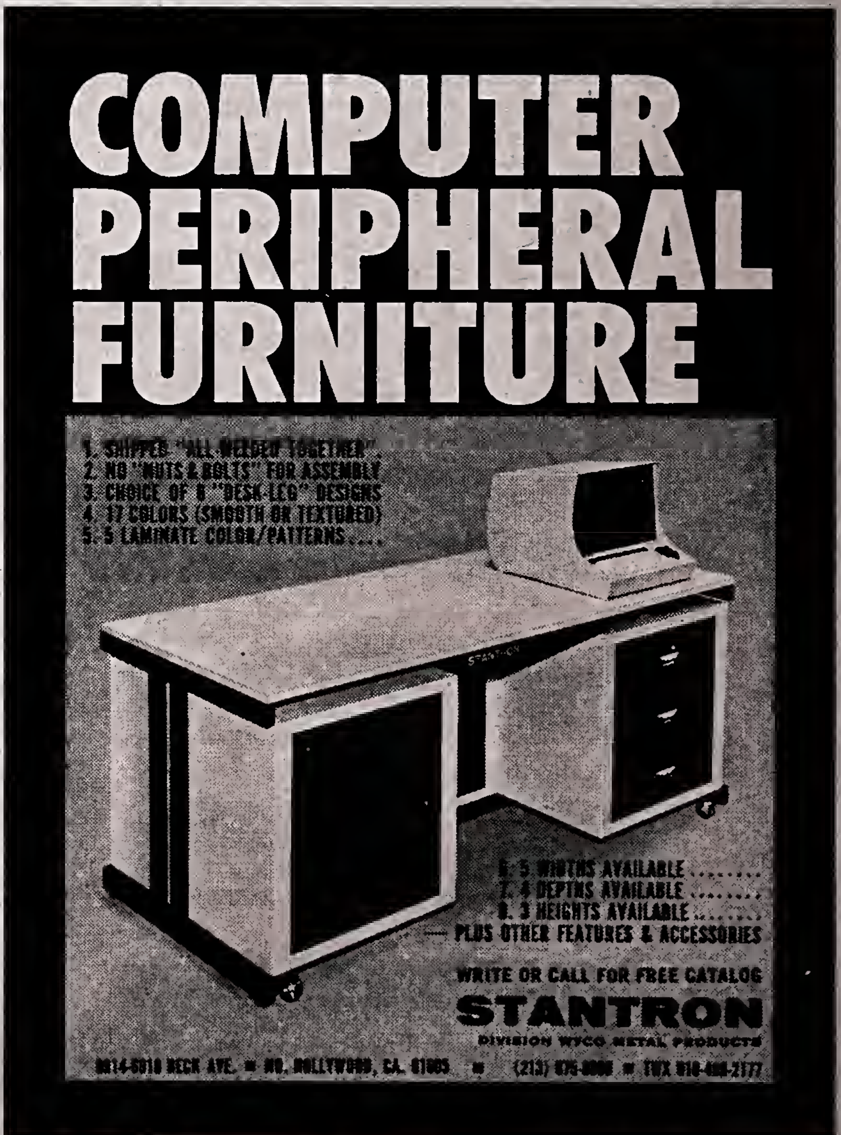
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New Masters

Using Terminal as Tool, Painter Turns Grid Into Fine Art

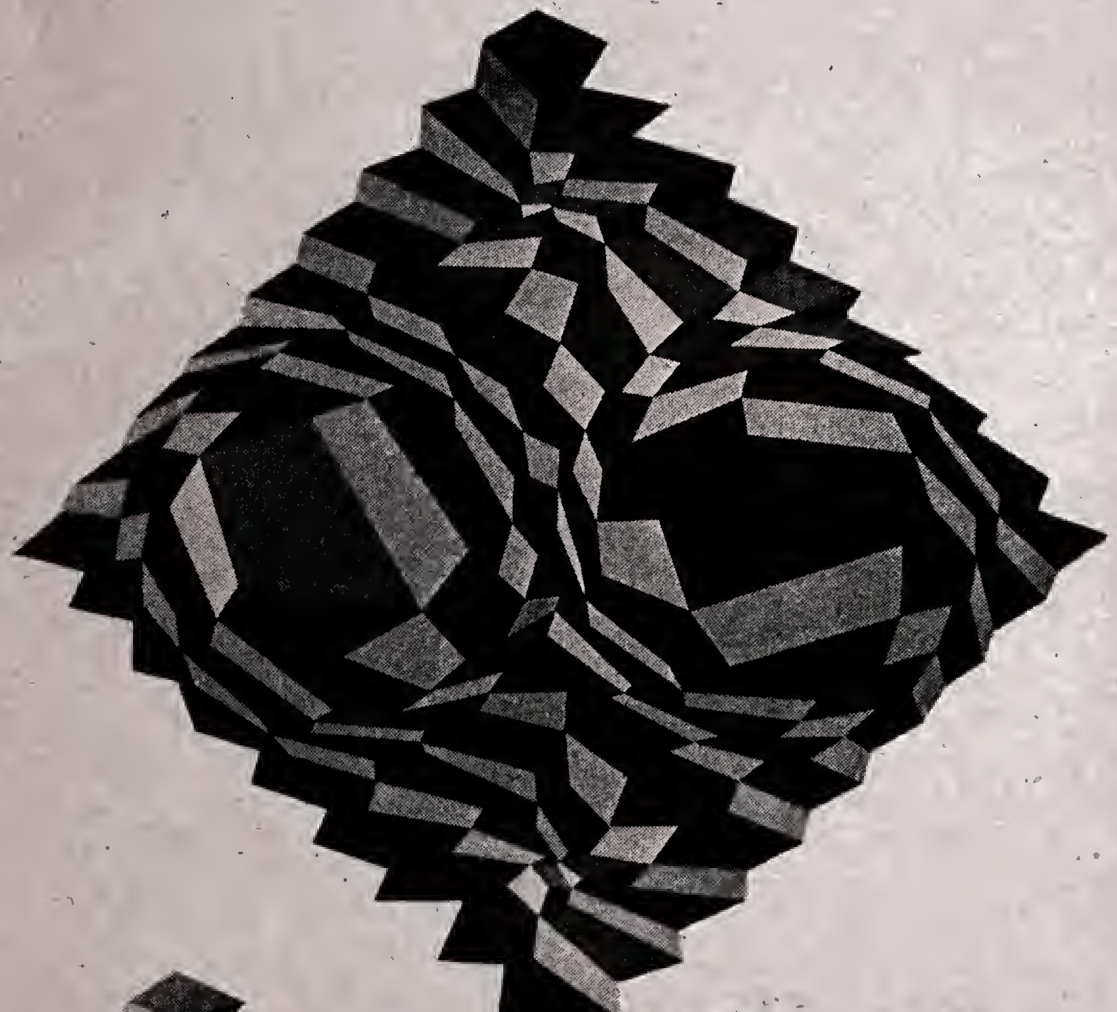

Figure A

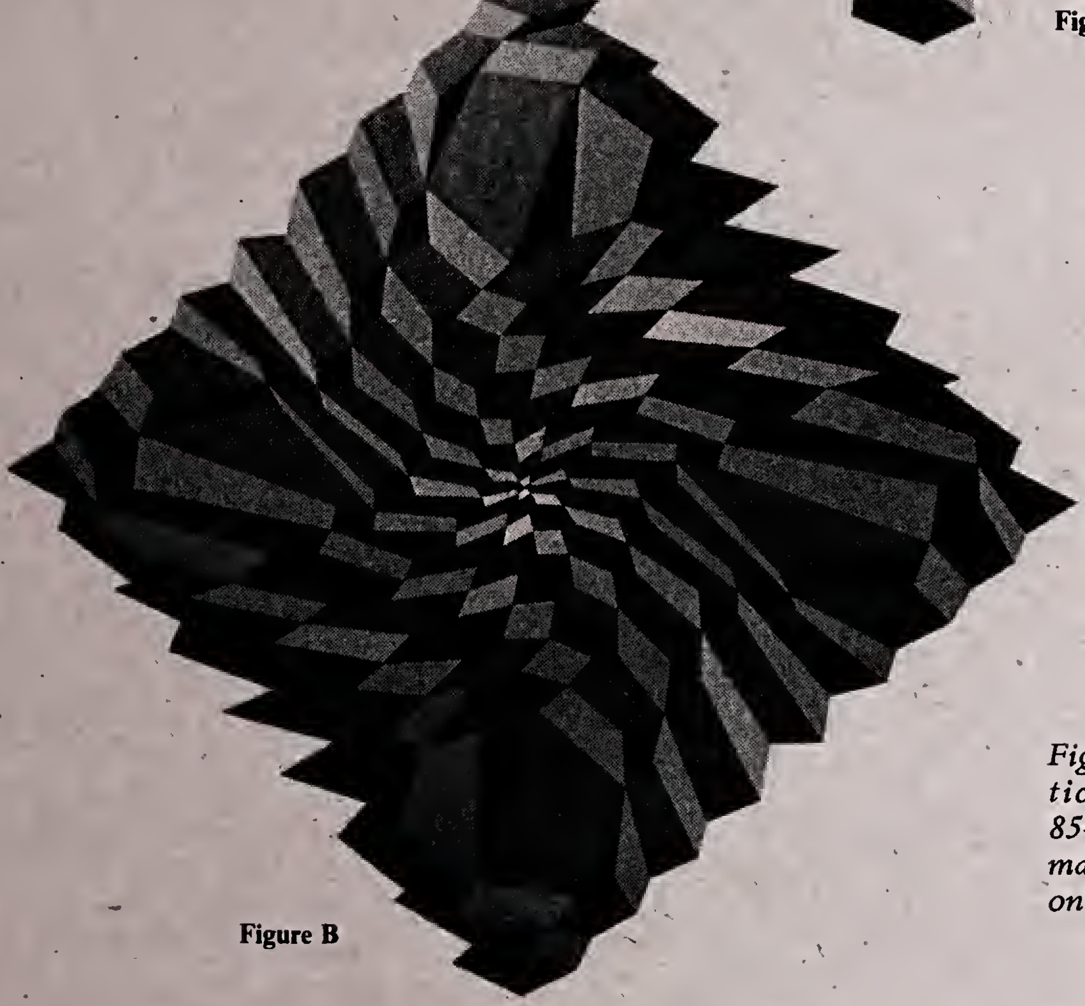

Figure B

Figure A. Chromatic Flux III, multicolored acrylic on canvas, 85-1/2-in. diameter. Figure B. Chromatic Flux IV, multicolored acrylic on canvas, 67-in. diameter.

By Nancy French
Of the CW Staff

MINNEAPOLIS — Artist Ruth Leavitt uses the computer as a "helpful, multifaceted tool" for creating designs she paints in vibrant-colored acrylics on large canvases.

Leavitt's paintings explore forces at work in nature such as blowing, flowing and growing, she explained.

But rather than painting the effects of these forces on nature itself, she isolates them and applies these forces to abstract designs.

At present, the artist said she is pursuing this idea by sketching and applying the forces of attraction and repulsion to grid patterns.

The computer helps her "deform" basic designs, she said. "Imagine a rubber sheet with a design on it or a rubber dollar bill that you can distort by stretching," she said.

That's what the computer program does.

To develop a design, Leavitt works interactively on a Control Data Corp. Cyber 74 computer using a Tektronix CRT terminal. Input is numerical and based on small sketches, she said.

"I draw vectors or arrows. The tails of the arrows show where I'm pushing in and the points show where I'm pushing to," she explained.

Design on Slides

Leavitt's immediate output is displayed on the scope, and proofs are output on paper. However, once she is satisfied with a design, the output is drawn with an electronic beam gun onto 35mm black and white film which is made into slides.

"I then project the slides on canvas and trace them with a pencil and ruler," she said.

Colors are selected to reinforce the design image, she said, adding, "I usually work in light to dark or warm to cold colors."

Many colors are used. For example, Figure A contains 56 different colors, the artist pointed out.

Programs in Fortran Extended

Leavitt's programs are written in Fortran extended to include graphics capabilities.

While this artist does not actually code her programs, she said she knows what to ask for and how to ask for it. "It's fun," she noted.

Leavitt was introduced to computers by her husband, Jay, who teaches in the Computer Science Department at the University of Minnesota.

Her first encounter with producing art with computers involved experimenting with and creating graphics with a program that already existed.

"I started out with a free-form picture and drew and shaded it using a light pen on a CRT. But everything I drew so freely on the scope ultimately turned into a grid," she explained.

"I wanted to break out of the grid into something freer — a bit more lyrical," she said.

She then got the idea for a program that would stretch and distort the images. Ironically, the artist now begins with the grid she used to end up with and ends up with the free-form design she was seeking, she said.

Artistic Achievements

Leavitt received her B.A. degree with a major in studio art at the University of Minnesota in 1969.

Her work has been exhibited internationally and has won numerous awards including a fellowship from the National Endowment for the Arts.

Leavitt edited *Artist and Computer*, one of the few books ever published about computer art.

University Producing Grads 'Pretrained' in Business DP

BUFFALO, N.Y. — The State University of New York at Buffalo is teaching students what happens in the "real world" of business data processing so they do not have to be retrained once they begin work.

The two-year-old business DP program is very different from a typical computer science degree program, according to Irving Sherman, chairman of the Information Systems Management Program. "We do none of the theoretical computer science programming here," he explained.

Students learn to devise business-type applications such as payroll, invoicing and billing. Languages taught include Fortran, Cobol, Assembly language and PL/I.

Systems analysis is another part of the curriculum, Sherman said. Casebook problems are studied and students then work with real-life situations.

A third area of study is operations management in which students learn the operations of a computer room including security, scheduling, hardware and software acquisitions, documentation, organization and personnel. Senior students also learn the duties of a director in systems environment, Sherman noted.

The faculty members are experienced in the DP field and rely on their own experience plus articles, textbooks and any other sources that relate to problem areas that could be encountered in the "real DP world," he said.

The objective of the program is to produce an immediately productive person, according to Sherman.

A cooperative program is also offered to give students actual working experience. Sherman has been told by companies that student co-ops outproduce professionals and their training gives them the equivalent of two years' experience in the field.

Currently, 15 students are enrolled in the co-op program; 120 students are in the entire program. The number of students is expected to increase to 140 this September and "it is the most rapidly growing program in the school," Sherman said.

Besides the required courses in the Information Sciences Management major, students are required to take courses in accounting, industrial psychology, statistics, speaking and management science courses in order to obtain their bachelor of science degree, Sherman said.

In last year's graduating class, there was a 100% employment success rate, he said.

"Our program deals with business problems and their solutions and applications and is probably the only one of its kind," Sherman said.

30,000 Earn Badge

Boy Scouts' DP Savvy Growing

By Paul E. Garrison
Special to Computerworld

PHILADELPHIA — Since the late '60s, more than 30,000 people have taken a major step toward becoming members of the computer community.

However, the source of these candidates was not colleges, business schools, high schools or correspondence courses. Instead, these eager achievers came from the ranks of the Boy Scouts of America.

Last year, somewhere in the U.S., a scout saluted and gave an official scout handshake to his scoutmaster. He was then given a signed card signifying his earning of the computers merit badge. He was also presented with a multicolored patch about the size of a quarter symbolizing the computer field the scout had intently explored.

This Scout was one of about 6,000 who have annually earned the badge during the past few years.

Tallies for 1976 are still being tabulated by the Statistical Service Department of the Scout organization, but probably during the summer of '76 the 30,000th scout achieving this merit badge was honored.

Scouts who want to earn the computers merit badge are required to give a history of computers, explain the major parts of a computer system and describe four different uses of computers.

They must tell of the differences and uses of both analog and digital computers. The differences between special- and general-purpose machines also must be explained.

To the satisfaction of the adult counselor, they must then tell what a program is and how it is set up; differentiate between an assembler and a compiler; and describe a source and an object program.

To tie in computer skills with scouting lore, they must use a flowchart diagram to show the steps needed to set up a campsite. As an option, they can prepare flowcharts to figure average attendance and dues paid at five troop meetings or work out a simple arithmetic program using flowcharts.

Four input/output devices for computers must be explained as well as the use of two of them in a system. The Hollerith code must also be described.

The scout must show how his name and address would be punched on a card. He then must select six of 10 terms to describe such as byte, console, microsecond and interrupt. Then 12 of 21 terms must be described from such words a truncation, cybernetics, simulation and information retrieval.

A computer installation is to be visited and its workings studied. The responsibilties of the design engineer, customer engineer, programmer, analyst, operator and salesman must be explained.

The scout then must read and describe information about computers secured from his local library. Finally, he must describe jobs in the computer field.

To qualify for the badge, the scout must appear before a volunteer adult called a merit badge counselor. This person is most often a specialist in the computer field and approved by the local scout unit or scout council.

The scout who pursues the badge uses as a "handbook" the computers merit badge pamphlet, which is a 55-cent booklet that describes the requirements in detail and gives helpful suggestions. It was written by J.A.N. Lee.

The computers merit badge pamphlet is available from many public libraries, schools, local scout supply outlets, council offices or from the Supply Division, Boy Scouts of America, North Brunswick, N.J. 08902.

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Hewlett-Packard Computer Advances

Vol. 2 No. 1 May 1977

HP 7920-
the disc that doesn't keep
your CPU waiting

Cache speed memories at
semiconductor prices

Ten years of innovations

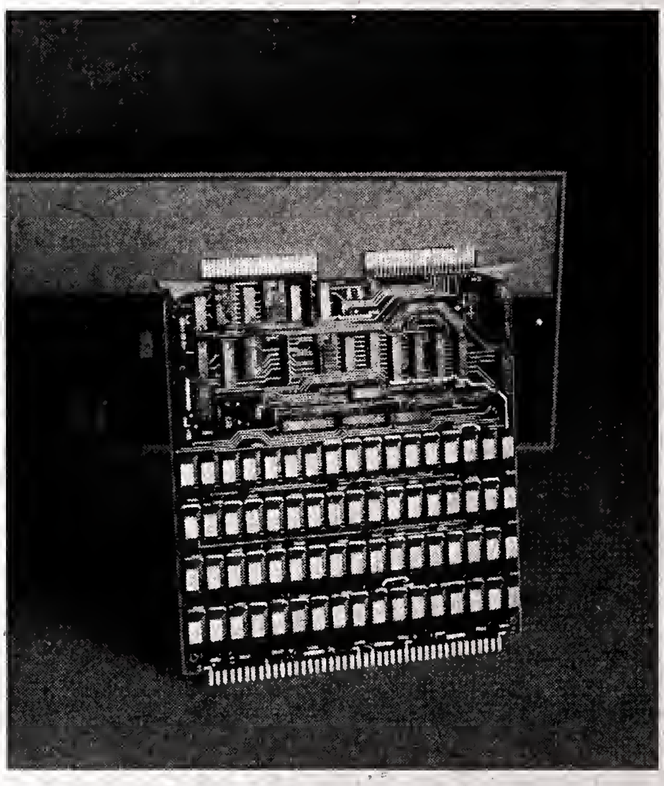
Evolution of a
low cost computer

CMOS/SOS

You can't have a fast system without fast memories

As data bases grow even larger, data processing systems are becoming more and more memory centered. System performance is becoming as much a function of memory speed as of processor speed.

Recognizing this fact, HP frequently offers improved memories to its end user and OEM customers. The new HP 21MX E-Series high-speed memory and the new HP 7920 disc are two such recent examples. Both of these products increase the performance of HP computer systems.



30% increase . . .

The addition of high-speed memory to the 21MX E-Series computer results in up to 30% overall system performance increase.

30% increase . . .

The addition of the high-speed HP 7920 disc to a 256k byte 3000 Series II results in a 20% improvement in system response time in interactive sessions and a 30% improvement in throughput.

Cache speed memories at semiconductor prices

In the time it takes light to travel 100 meters, an HP 21MX E-Series with high-speed memory can retrieve information and be ready for another access. That's performance!

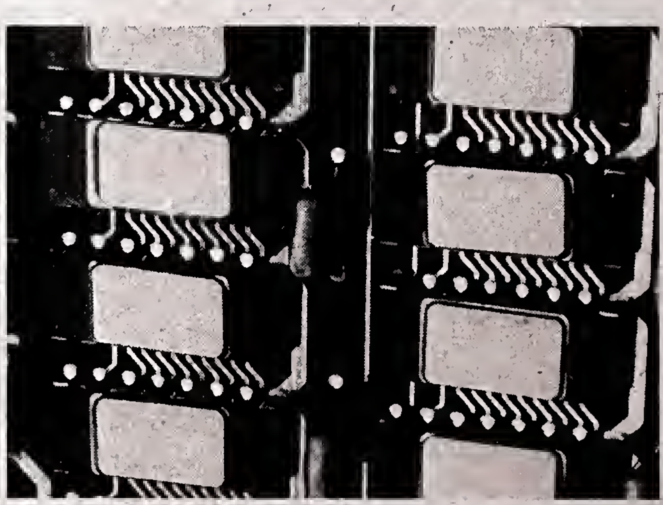
New 4K RAMs cycle fast

A major contribution to this speed is the use of new memory technology. The 16k word high-speed memory uses N-Channel MOS/RAM memory chips from a leader in semiconductor memory design and manufacture. The compact parts incorporate the latest process and design techniques to create chips that cycle in 320ns.

◀ *Cover*

In a typical quarter of a second, the HP 7920 disc can complete three 256 track seeks and transfer a total of 129k bytes of data. The low profile heads fly 35 millionths of an inch above each closely spaced disc surface. This design results in a slim and compact disc that is easy to carry and store—a feature not to overlook as your data base grows and grows.

The second contribution to speed is the result of changing the structure of the controller and using new-technology parts. This combination almost eliminates overhead imposed by the controller. It performs its function in only 30ns. Cycle time of the system then is 350ns—almost that of the chips themselves.



The latest technology semiconductor MOS/RAM memory chips have been densely packed on this new 16K words board, which measures only 22cm by 20cm. (Shown actual size.)

Reliability results from experience

The maintenance prices for HP's semiconductor memory reflect the reliability of the technology. $10* a month service charge per board is among the lowest in the industry.

Since the May 1974 announcement of 4k RAMs semiconductor, HP has shipped approximately two million memory chips in its 21MX Series and 3000

Continued on page 8

In three minutes . . .
An HP Service Engineer, with two screwdrivers can separate the disc into its basic service units.

HP 7920-the disc that doesn't keep your CPU waiting

The new 50 megabyte (formatted) HP 7920 disc has some of the fastest access times in the minicomputer industry. (Seek times: Track to track— 5 ms, average 25 ms, and worst case—45 ms.)

Start-up, stop, and access are fast

We designed a light carriage/rail system for lower mass, and a linear voice coil motor with high force inputs. Low mass and high force allow higher accelerations, and therefore greater speed.

Speed in stopping and accurately positioning the head is equally important. High-speed feedback circuitry, which derives a signal directly from the surface of the disc, allow optimization of over-shoot and settling times.

By concentrating on these factors that affect seek time, plus choosing a healthy rotational speed of 3600 RPM, we gained impressive access times.

Reliability is designed in

Stored magnetic data is priceless. HP's discs are designed with that keenly in mind. The disc controller detects and corrects errors to a degree that is rare for discs in the 7920's price range.

The Error Correction Code hardware and algorithm are together capable of correcting one single-burst data error per sector, if the error is of length ≤ 32 bits. Every single-burst data error of length > 32 bits but ≤ 48 bits will be detected without being miscorrected. For burst-errors of > 48 bits, 99.999% are detected.

All disc drives are susceptible to environmentally caused errors. Airborne contaminants, for example, can cause head crashes and data loss. To prevent this, the standard dual filtration system of the HP 7920 contributes to reliability by removing 99% of particles 0.3 microns or larger.

Another environmental factor that can affect a disc's error rate is the condition of the power line. In the HP 7920, a brushless DC spindle motor isolates the rotation of the disc from incoming power line changes. This is especially important where power line regulations are relaxed or where the power source is uncertain, such as on board a ship or train.

In the event of a blackout or circuit break, an emergency head retract prevents head crashes. The disc heads are removed from the polished disc surfaces and placed in a rest position before the disc has lost appreciable speed.

Write data at 10° C, read at 40° C (or vice versa)

The HP 7920 tolerates a wide environmental range of operation. Error performance/interchangeability of HP 7920 disc packs is guaranteed over its entire temperature range. This applies not only on one drive, but also one to the other.

10,000 discs later...

HP has now manufactured over 10,000 drives of its own design. The new HP 7920 is the second in the family of controller compatible discs.

The HP 7920 costs $17,500* with a controller; add-on drives can be purchased for as little as $13,000* (Quantity discounts available.) **For further information on the new HP 7920 disc, check B on the reply card.**

---

*U.S. domestic price only

Ten years of innovations from HP

A major supplier of business computers recalls its first decade in industry, science, and education

One can only speculate on the future of computers. In less than three decades, they have had a profound impact on business, research, education, and manufacturing. Hewlett-Packard has contributed significantly to computer technology for over one-third of that time. As a glimpse at the following pages reveals, it is often easier to look ahead by simply reflecting on the past…

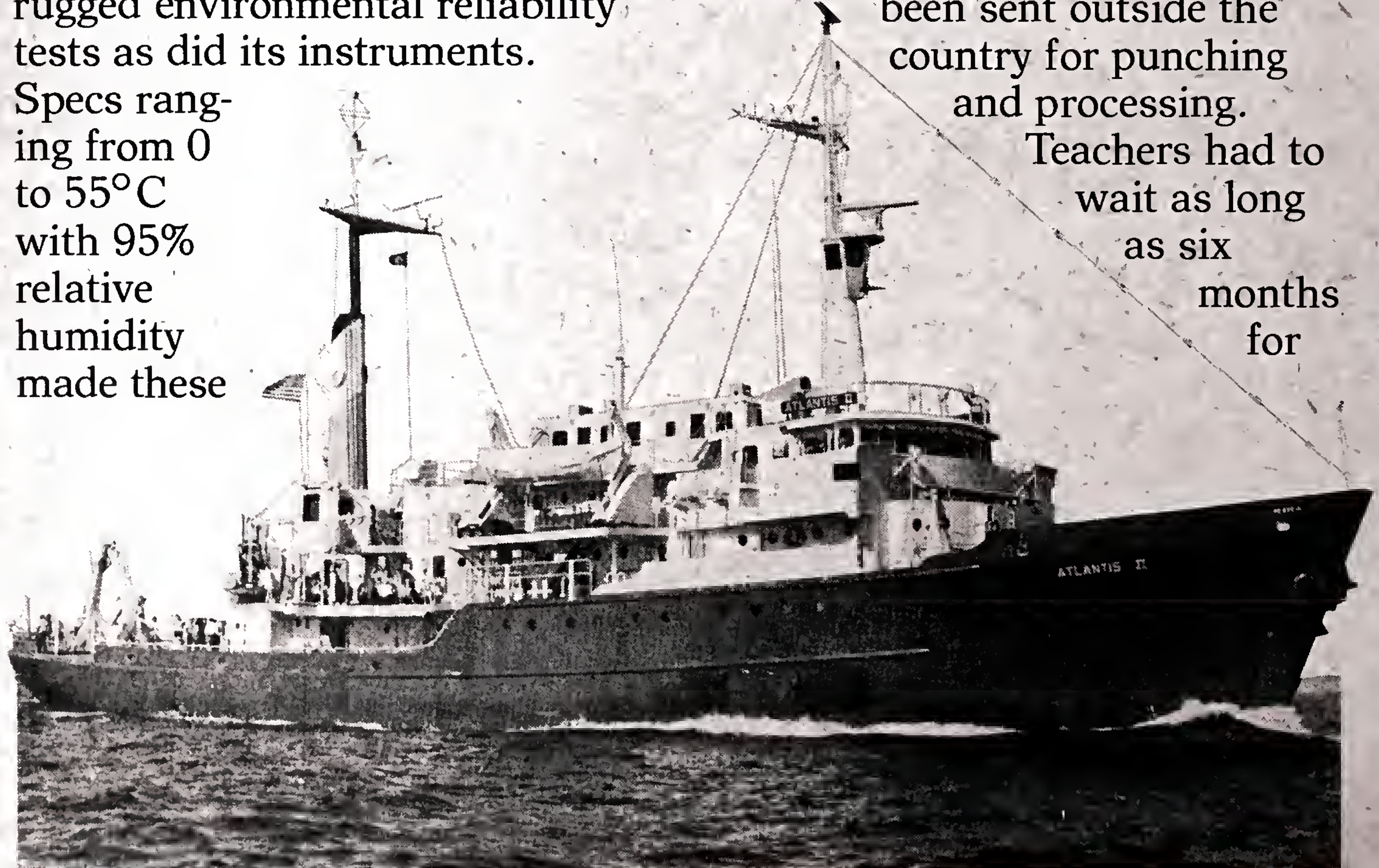
66

Several crew members on a fleet of research vessels off the Cape Cod coast have logged more sea time in the last decade than most oceanographers. They are HP 2116A minicomputers, still doing underwater research for Woods Hole Oceanographic Institute of Woods Hole, Mass.

HP insisted that its first computers, HP 2116As, pass the same rugged environmental reliability tests as did its instruments. Specs ranging from 0 to 55°C with 95% relative humidity made these **instrument-rated computers** "go anywhere, do anything" tools.

Woods Hole's HP 2116As have collected and analyzed data from unpredictable marine environments from the Labrador Current to the Black Sea.

In one case, HP 2116As have acquired and processed seismic, magnetic, and gravity data used to study the earth's crust for evidence of continental drift and sea floor spreading.



68

The popular HP 2007 system introduced the minicomputer industry to the concept of **batch BASIC via mark sense cards** and an optical mark reader. In Malawi, Africa, at the Regional Test Centre, this system freed teachers' valuable time from exam processing.

Previously, data had been sent outside the country for punching and processing. Teachers had to wait as long as six months for results which they now receive in less than a day.

From the Regional Test Centre, the HP 2007 also traveled over 1,400 miles in a four-wheel-drive vehicle, a trip that included treacherous dirt roads and a harrowing ferry ride. Surviving the rigors of the trip, the HP 2007 was up and running one hour after reaching its first destination.

The African climate also put the computer to test under sweltering conditions. Specs quote temperature ranges of 10° to 40° C with 80% relative humidity. Malawi humidity exceeded 90% during half the year.

69

At a time when no other minicomputer manufacturer could offer a **timesharing system,** the University of Virginia's School of Engineering and Applied Sciences was operating an HP 2000A that supported up to 16 terminals in conversational BASIC.

The University was committed to the concept of in-house timesharing for instructional computing. This HP 2000A system was

more economical than conventional timesharing services.

That was nine years ago. Today, the University has expanded to three HP2000 systems and a total of 96 ports that provide students with timesharing access 24 hours a day, seven days a week.

71

The first minicomputers with **user-microprogrammable control,** HP 2100s have proven invaluable for Scan Optics Inc., East Hartford, Conn., in controlling high-speed, optical character recognition systems.

With 2100 microprogramming capability, Scan Optics could develop their own firmware, and thus tailor systems to specific requirements.

The ability to upgrade without major hardware or software changes more recently enabled Scan Optics to convert to newer, faster 21MX-based systems.

Mitsui Co., Japan's leading general trading firm, relies on one such computerized scanning system for improved communications among its 185 offices in 77 countries. With this system, messages sent all over the world can be processed at a rate of 60 pages a minute.

73

A forerunner in computer network development, HP's first **distributed system** consisted of a 9700 RTE-based central computer and multiple satellites that communicated with each other in both directions. Sharing peripherals in this network structure resulted in lower-cost remote computers. Faster response times and increased reliability are just two benefits of a network concept.

An early network customer was the Division of General Research in Denver, Colorado, part of the U.S. Bureau of Reclamation. They rely on an RTE-controlled distributed systems network, with seven satellites connected to a central, to perform hydroelectric testings on dams, canals, and spillways, as well as critical concrete testing.

73

When the clinical laboratory of a major hospital in Connecticut ordered the first HP 3000, it received several industry breakthroughs in a single system.

The Multiprogramming Executive operating system enabled the HP 3000 to perform **concurrent timesharing, batch, and real-time operations.** Stack architecture streamlined program execution. Virtual memory, the SPL programming language, and full ANSI COBOL were other notable HP 3000 firsts.

The HP 3000 is used to derive, store, and disperse findings from human fluid tests. This process begins when blood is taken from a patient. A mark sense card attached to the blood tube contains patient information and specific test requests—for example, check for glucose concentrations. This data is entered in the computer.

At lab test stations, heat and chemicals are added at various intervals. Light readings from the samples are converted by the HP 3000 to show the glucose concentration.

Besides lab research, the HP 3000 also sends billing data to a remote IBM central for processing.*

---

*This HP 3000 application was developed in conjunction with the Clinical Laboratories Department of the Yale-New Haven Hospital, New Haven, Conn.

74

HP's use of state-of-the-art **semiconductor memory design** inaugurated a new generation of smaller, faster, more reliable, and less expensive small computers—the 21MX Series.

As HP computer products matured, Camsco Inc., of Richardson, Tex., took advantage of family compatibility and converted its 2100-based computerized graphics systems to these 21MXs.

One Camsco product is a numerically-controlled cutting system which uses a 60,000 psi jet of water as the cutting medium. The position of the cutting jet is controlled by the 21MX.

74

HP introduced IMAGE/3000, the first **data base management system** on a small computer. Schmalbach-Lubeca, a German-based member of the Continental Can group of companies, has been using IMAGE to help ensure fast delivery of over 10,000 products to 2,500 customers. It has provided timely information about order processing, production inventory, and delivery.

The company has plans for nine more IMAGE/3000 systems at its various factories. These will interconnect to form one powerful distributed system for data base management.

75

By virtue of its **shirtpocket-size, 3M mini-cartridge,** HP's 2644A terminal was the first to offer internal mass storage. Management Systems Inc. of America, based in Atlanta, Ga., incorporated HP 2644s in its ACTION system—A Clinic Terminal Information On-Line Network.

ACTION improves the handling of patient account status, insurance files, appointment schedules, and hospital census records.

76

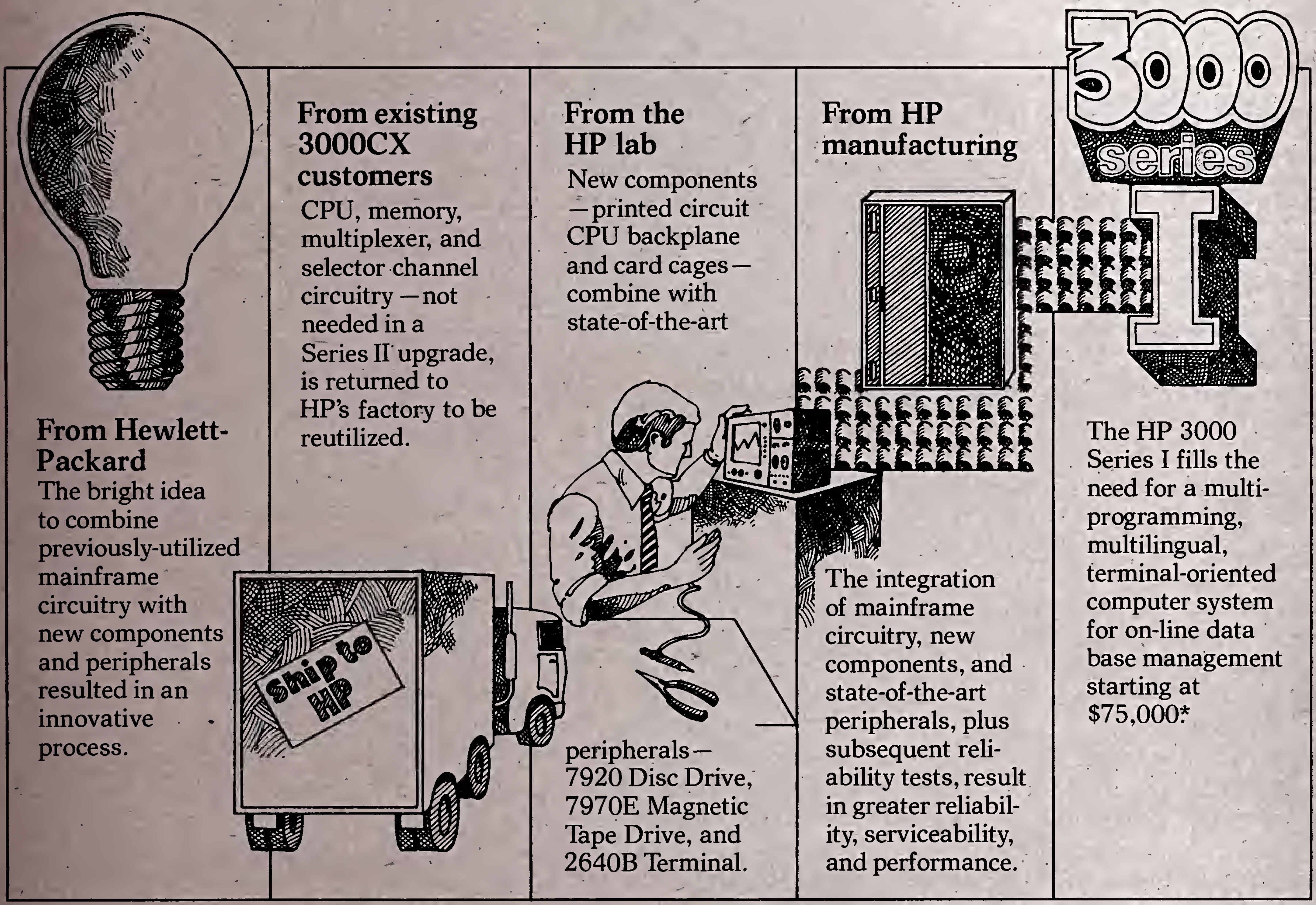
The power and elegance of APL became available for the first time on a small, general-purpose computer with HP's **APL\3000** and the 2641 APL terminal. As the test site of APL\3000, Yale University's Computer Science School has seen its APL students advance three times faster in programming skills and general understanding of EDP than those studying conventional programming languages.

An entire program for sorting a set of numbers, for example, can appear in this concise APL form:—

```
X[⍋X]
```

Another HP language first was the FORTRAN II compiler on the HP 2116A minicomputer. Throughout the past decade, HP has pioneered these and other languages, keeping in mind that hardware technology cannot be successful by itself.

Evolution of a low cost computer



From Hewlett-Packard
The bright idea to combine previously-utilized mainframe circuitry with new components and peripherals resulted in an innovative process.

From existing 3000CX customers
CPU, memory, multiplexer, and selector channel circuitry—not needed in a Series II upgrade, is returned to HP's factory to be reutilized.

From the HP lab
New components—printed circuit CPU backplane and card cages—combine with state-of-the-art peripherals—7920 Disc Drive, 7970E Magnetic Tape Drive, and 2640B Terminal.

From HP manufacturing
The integration of mainframe circuitry, new components, and state-of-the-art peripherals, plus subsequent reliability tests, result in greater reliability, serviceability, and performance.

The HP 3000 Series I fills the need for a multiprogramming, multilingual, terminal-oriented computer system for on-line data base management starting at $75,000.*

New technology has permitted the computer industry to average a 30% annual price drop. HP, recognizing the demand for 3000 system capabilities at a lower cost, developed an innovative method of transcending the cost/performance ratio.

The result: HP's 3000 Series I, a multiprogramming, multilingual, terminal-oriented computer system for general-purpose processing. With proven performance increases of 10-50% over earlier equivalently configured 3000CXs, the Series I starts at $75,000.*

The Series I offers standard Series II capabilities such as the state-of-the-art Multiprogramming Executive (MPE) operating system, IMAGE data base management system, and five languages: COBOL, RPG, BASIC, FORTRAN, AND SPL. Depending upon the application, the Series I supports up to 16 terminals. For applications requiring more terminals or greater throughput, it can be upgraded to a Series II without rewriting applications or retraining users.

What the HP 3000 Series I also offers is already-proven 3000CX mainframe circuitry integrated with new components and sophisticated peripherals for increased reliability, serviceability, and performance. The new performance level of the Series I should make it especially interesting to small and medium-sized businesses, educational institutions, divisions of large companies, and system houses.

Check C on your reply card for more descriptive information about the HP 3000 Series I computer systems.

*U.S. domestic price only; OEM discounts available; available in North America only.

New & Noteworthy

First details from Hewlett-Packard's CMOS/SOS lab are made public

Micro CPU chip (MC^2) has approximately 10,000 transistors in a total area of 34 square millimeters.

The first accomplishments from Hewlett-Packard's three-year old CMOS/SOS laboratory in Cupertino, California were revealed in Philadelphia on February 17th in proceedings of the International Solid State Circuits Conference.

A technical paper entitled, "A CMOS/SOS 16-Bit Parallel Micro CPU" was presented, which described a microprocessor optimized for controller applications. The micro CPU chip combines low power consumption, high speed, high circuit density, and static operation. All these features are characteristics of the CMOS, silicon-on-sapphire process, and the combination offers advantages over other technologies. A year's worth of tests on some 20,000 parts have reinforced HP's confidence in the consistency of performance obtainable from the micro CPU chip and in the laboratory's ability to achieve required volume and economical yields. Figures given indicate that yields have been running between 12% and 24%.

HP invested in CMOS/SOS to gain system level performance advantages, which we are now achieving. Much effort has also been in testing for reliability. Current data based on significant quantities, show the reliability to be excellent. HP products benefiting from the process will be introduced this year.

An article on this high-speed, low-power, high-density chip appears in the April issue of the *Hewlett-Packard Journal.* **For your copy, check D on the reply card.**

Continued from page 2

Series II computers. All memory parts and boards undergo vigorous burn-in and diagnostic tests to discover and correct faults not discernable in other ways. Accumulated hours of testing before customer shipment ensure a highly reliable product at, and long after, delivery. Three million memory device hours of MTBF testing projects that reliability should be as good as our field-proven memory.

The new memory meets the same environmental specifications of the 21MX E-Series, i.e. 0-55°C, up to 95% humidity and tough shock and vibration. These are the only commercial 350ns semiconductor memories available with such stringent specifications.

Asynchronous memory enables speed gains

The 21MX E-Series has a fully asynchronous interface with memory. This innovation makes it possible for present and future E-Series users to take advantage of this new high-speed memory by simply plugging it in. Memory technology will continue to change at a rapid rate. HP users have the assurance that their computers will be able to take advantage of faster, larger, more reliable, and less expensive memories as they become available.

With a speed of 350 nanoseconds, the 21MX E-Series high-performance memory exceeds that of many cache memory schemes. Most of the throughput benefits of high speed cache systems can be realized without the associated cost. The new 16k word, high-speed memory sells for $2100.* The controller is priced at $600.* **Check A on the reply card for further details about HP's new memory.**

*U.S. domestic price only

Computer Advances, written to inform professionals of the latest technical contributions from Hewlett-Packard's engineering labs, appears regularly as a compilation of product and customer innovations.

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DP Model Forecasts Housing Trend for Next 10 Years

By Ann Dooley
Of the CW Staff

PRINCETON, N.J. — A forecasting model has predicted an average of 1.8 million new homes will be built over the next 10 years and mortgages will reach $165 billion annually, according to researchers here.

The model also gives information about the number of households by age of homeowner, type of residence and location, according to Prof. Kenneth Rosen of Princeton University, who developed the model with Prof. Dwight Jaffee.

The projections are based on 50 variables which indicate probable levels of market activities rather than the usual method of using U.S. Census Bureau statistics on projected household trends.

Three different forecasts were used. One was a base forecast with data consisting of what is most likely to happen in the next 10 years with no major changes in the market, Rosen said.

A second forecst was a pessimistic type including assumptions that major capital shortages and an overall economic tightening will occur, he said.

The third forecast was an optimistic one in which inflation winds down and building increases, Rosen said.

The model is being offered to corporations and businesses through the Interactive Data Corp. time-sharing network.

In addition to the 50 variables entered into the system, the forecasting model allows users to specify their own economic conditions and add appropriate equations for long-range strategic planning and product line forecasts, Rosen said.

Large banks, construction material firms, savings and loan institutions and any business that needs a tool to see what might be coming up for them could use the model, he added.

Some of the 50 variables include changes in interest, income, mortgage rates, unemployment, price of housing and land and the age of the owner. "We enter our assumption variables and then determine growth and other conclusions," he said.

In the past, the new homes averaged between 1.2 billion and 1.5 billion yearly. "This year it's 1.9 [billion], but it's a very volatile business and varies considerably each year," Rosen said.

Years in which there are two million housing starts will predominate over the next 10 years, with a major shift away from multifamily and mobile home units towards single-family detached housing, Rosen said.

The model also indicated prices will climb quickly as a result of increased housing demand and the rising cost of developed land, he added.

"By 1986, the median price of a new home could be as high as $90,000. However, under the basic scenario forecast, income is rising faster than prices so most families will not be hurt by the housing price explosion," he said.

Rosen noted that the one exception is young families, "as many as 60% of new entrants to the housing market will be unable to purchase the median-priced home over the next decade," he said.

The model indicated a drasic drop in young family households under the age of 24, while family households of people between 25 and 35 years will rise, Rosen said. A slowdown is also predicted for single-person household formations.

The model consists of a 13-year historical data base, 10-year forecast data updated quarterly and an operating model which allows manipulation of eight key variables.

DP Graphics System Lets Consumer Design His Own Dream House

CAMBRIDGE, Mass. — Someday soon, the average consumer may be able to design and plan his own "dream house" with the aid of a computer.

Still in the research stage, Architecture-by-Yourself is an experiment in computer-aided design under the direction of Prof. Nicholas Negroponte of MIT.

Its purpose is to enable a layman to instantly visualize and create a design without external factors influencing his ideas, Negroponte said.

The system is entirely graphical using Imlac Corp. dynamic displays. With his finger, the designer sketches on the touch-sensitive digitizer and the Interdata Inco 7/32 minicomputer — upon which the system is based — reads and arranges the lines and spaces that have been indicated.

"The user manipulates the entity on the screen in real-time and the machine answers back in real-time about the consequences," according to Guy Weinzapel, an MIT research associate said. "Anytime there is a barrier between the designer and what he's designing, it influences the quality," he added.

While some professional architects still regard computers with suspicion, most consider them a useful tool. They believe computers should be kept in perspective and used only as an aid in designing, Weinzapel explained.

If a computer were programmed with architectural designs or styles, it would standardize and limit any chance for creativity, he pointed out. "It would be paternalistic as hell to have some machine spew forth a style design," he added. The object of Architecture-by-Yourself is not to usurp the role of the architect but to facilitate user creativity, he stated.

Negroponte indicated his research is not directed toward a specific application, but is intended to probe into man/machine interaction in which the machine implements the user's intentions.

"The most crucial thing about our research is that it will have an impact on people who are developing systems of all kinds," Negroponte said.

CLA Sets Meeting Today On Taxation of Software

SAN FRANCISCO — The Computer Law Association (CLA) will hold a conference here today devoted largely to the problems of taxation of software and services.

Workshops will feature discussions of state and local taxation of computer products and services; DP taxation at the federal level; and taxation aspects of international trade and transactions.

Registration fee for the one-day conference is $20 for CLA members and $30 for nonmembers. Additional information is available from Richard L. Bernacchi, Irell and Manella, Suite 900, 1800 Ave. of the Stars, Los Angeles, Calif. 90067.

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ENROLL: *Case Study User Forums** will be conducted in all nine cities by leading users and independent consultants. Topics are: Applying Minicomputers (Tuesday) • Managing Terminal Networks (Wednesday) • Improving Software Productivity (Thursday)

NOTE: *Computer Designer Forums** will also be available in San Francisco, Los Angeles, Chicago, New York and Boston. Topics include: Evaluating and Using Microprocessors • Evaluating Peripherals for Mini- and Microcomputers • Evaluating Memory and Storage Devices

*The Forums are held in conjunction with COMPUTER EXPO and require separate registration and fees. They are held each day from 9 AM to 1 PM. One day's admission fee is only $45; additional days are $35. Advance registration is recommended. Call (800) 225-3080 to reserve your space and get complete registration materials.

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Editorials

Standards — Once Again

The state of standards in the DP community is atrocious, and the extent of the problem can be seen by taking another look at the ongoing battle over an I/O interface standard.

Such a standard was originally proposed in 1965 by the National Bureau of Standards' (NBS) Institute for Computer Science and Technology for the federal sector.

It is now 12 years later and that proposal is on the verge of implementation — if the mainframers can't prevent it.

A major lobbying effort is apparently now underway to prevent the adoption of the proposed standard — and at least IBM and NCR have written strongly worded letters about the matter to the NBS.

The main contention against the standard is that it will stifle innovation in the industry and the standard — based as it is on IBM's channel interface — will favor IBM.

However, the mainframers fighting the idea have apparently not proposed — in a 12-year period — a substitute standard that might both accomplish the purpose and, at the same time, not favor IBM. They largely have only themselves to blame.

On the point of technical innovation and the possible lack thereof with a standard, the Computer and Communications Industry Association (CCIA) recently compiled some interesting statistics.

First, the CCIA pointed out IBM has been using the proposed standard interface since 1963 and the same interface is used on all of the firm's latest equipment, including the 3033 CPU.

Secondly, the proposed interface did not stifle Amdahl Corp. in its new machines — they all use it.

Similarly, Cray Research, which is building some of the most technologically advanced machines currently in use, also uses this standard. Cray seems not to have been stifled.

The AS series of computers from Itel Corp. also uses the interface and the Unviac 90 series of equipment "also employs the same I/O channel interface with very minute modifications," the CCIA noted.

Those references "are clear enough to disprove that the I/O channel interface is neither outmoded technology, restricts computer architecture and technological development, nor is confined to one manufacturer's development," CCIA President A.G.W. Biddle commented.

The real reason the mainframers do not want a standard is so they can better control their users and make sure those users purchase peripheral units only from the original manufacturer.

Users, however, should want a wider choice in the purchase of peripherals.

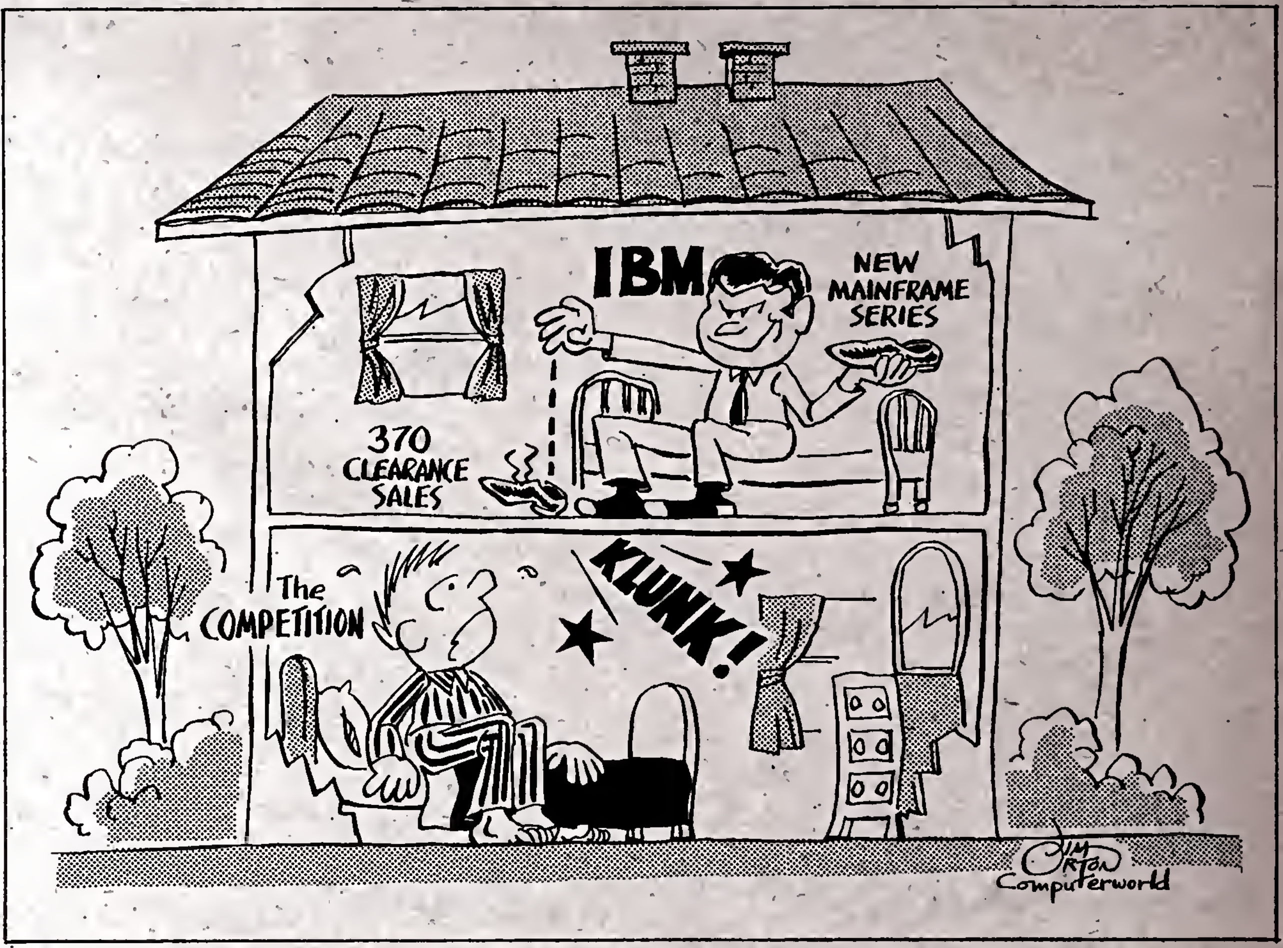
The manufacturers have mounted a strong attack on a federal standard in this area and users should write to the NBS in order to give the other side of the picture.

Data Past

Last week our "Data Past" column noted that in April 1972, the Justice Department had promised to give "top priority" to its ongoing antitrust suit against IBM.

It's now five years later and some observers estimate that it will be at least five more years before the case is ever resolved.

What happened?



The First One Drops

Letters to the Editor

Software Audit Bureau: No Free Lunch

As a respected member of the software industry, Aso Tavitian should be better advised ["Software Audit Proposed as Statistical Proof Respository," CW, April 18].

In his letter, he suggested Datapro and International Computer Programs, Inc. (ICP) have no economic incentive to audit statistical proof from vendors. He further suggested a software bureau as a repository of proof.

First, with regard to ICP sales awards, the vendor pays his own way to qualify. Cybertek paid well to have an independent audit and Gaap statement from an international Certified Public Accountant firm respected for its DP expertise as well as its leadership in accounting.

This is detailed book proof as opposed to sampling. What better measure than the audited dollar? The economic incentive was ours; we took it. Our first entry landed us on the $5 million round table last month, and we have already profited further from this award.

The only remaining question Tavitan raised concerns performance, i.e., quality beyond even the poor power of the dollar to add or detract. Anyone paying for the public display of his profile should have no problem in providing a comprehensive list of references.

Again, there is no free lunch; however, it is the buyer's responsibility to perform this analysis. The sharp ones do it well.

Fred Sanson
Assistant to the President
Cybertek Computer Products
Los Angeles, Calif.

Adolescent Business of DP

The gentleman who resigned his position in the New Mexico affair, following four others in the past two years ["Five DP Directors in Two Years Bite the New Mexico Dust," CW, April 18], appeared to be telling the world something of this adolescent business of DP.

I've been rubbing elbows and egos in it for about 25 years and expect to be eased out in some months by the three-score and five decree.

I'm not privy to the workings of a truly political organization — one of the governmental forms. But God knows every business organization is rampant with politics. You never keep your sanity without a sense of humor, a bit of it, anyway.

DPers want to call themselves professionals. Perhaps a better term would be "professionals" — as distinguishes a 2 from a "2."

Bill Ingersoll
Bridgeport, Conn.

An Alternative Technique

Richard Haasz's article on data compression as a design technique [CW, March 21] was interesting and helpful. Some people may still, however, shy away from anything so "fancy." There is an alternative.

Using the tried-and-true record type or sequence number as part of the record key (index or sort) allows you to design files with room for expansion without any special conversion routines. Some record types may be optional, while others will be required.

As long as programs are written to look for specific record types (and ignore all others), new record types can be added to the system without changing nonrelated programs.

H.R. Sides
Myrtle Beach, S.C.

Data Past

Five Years Ago
May 3, 1972

MONTVALE, N.J. — A study on *Government Regulation of the Computer Industry* written by two officers of the American Federation of Information Processing Societies (Afips) concluded that since increased government regulation of computer use appeared "inescapable," there was a need for a broad interdisciplinary study of the industry and the possible effect of further government relations.

— — —

ALBANY, N.Y. — Guidelines for security and privacy protection and for the enhancement of the efficiency of computerized criminal offender records were released by a special committee of Project Search.

While not binding, the document suggested that states involved in the Federal Bureau of Investigation's computerized criminal history project should implement the recommended precautions "as soon as possible."

Eight Years Ago
May 7, 1969

LOS ANGELES — An access method claimed to be three times faster than IBM's Indexed Sequential Access Method for either DOS or OS on the 360 was announced by Isaacs-Dobbs Systems, Inc., here.

Features of the random access method included less programming effort and significant operating economies for either random or logically indexed files, a company spokesman said.

— — —

BEDFORD, Mass. — Viatron Corp., which startled the industry when it announced its $39/mo processors last year, believed it could maintain the $39 pricing and still make a substantial profit.

DP Conservation: The Energy Plan's Missing Element

By Jack Stone
Special to Computerworld

President Carter's national energy plan, if accepted by Congress, will certainly impact every American citizen. Life styles will change, government restrictions will increase, corporate strategies will be modified and technology development will be redirected.

The essence of the proposed policy is conservation. The goals are to minimize waste, decrease consumption and reduce U.S. dependence on foreign energy sources.

To build the plan, a small but hardworking and conscientious staff struggled diligently to balance the concerns, suggestions, ideas and complaints from the academic, economic, sociological, environmental, labor, management and other constituencies that form the body politic. Those staff people who found their words in the President's pronouncements were ecstatic.

But, alas for the staff personnel whose ideas were lost, only banishment loomed in their futures; they could expect reassignment to the dungeons of the White House, relegated to dark and ignominious tasks such as operating the President's automatic signature-writing machine.

I bumped into one of those staffers at the regular Friday luncheon gathering at the Sans Souci. He happens to be an old college crony of mine by the name of Kendall Govington Burlingame IV. But what a picture of absolute dejection he was — pale, disheveled and distraught.

"Hey, KGB" — he never did express enthusiasm about his nickname — "buck up, old man. What in heaven's name is the matter?"

He glanced up, shrugged his shoulders, lowered his head, huddled closer to his martini and muttered, "I am not just a failure. I am an absolute and total disaster. I have been defeated for all of posterity. I am retiring to the highest peak of the Himalayas where I will seek solace in the winds and the rains and the sun."

"Now, hold on there! Get yourself together. The earth hasn't stopped rotating. The sun hasn't stopped shining. The sky hasn't fallen."

"But the sky has fallen! And it was to have been my biggest day."

"My dear friend, are you all right? Can I get a doctor for you?"

"Oh, you don't understand. You're too far removed from politics. Let me explain. You see, I am referring to the President's speech to the American people — the 'fallen sky' talk on the energy crisis. I am suffering because all of my input was deleted from the script."

"Just what were you proposing?"

"Well, my basic theme is that the energy plan does not go nearly far enough. Sure, it covers energy waste related to cars, homes, industrial plants and appliances, but it desperately needs to be extended to control the worst energy waster of all — the computing installation."

"That sounds pretty serious."

"You can't imagine how inefficient most of the American installations are."

"Well, I have some rather strong ideas along those lines. What did you have in mind?"

"I proposed a national processor utilization tax to be levied on those multiprogramming installations that are operated with less than a standard number of initiators. The tax would, of course, be graduated, with heavy penalties for those centers that run inefficiently — for example, that run payroll as a stand-alone job — and with substantial rebates to those centers whose average number of initiators in operation exceed the standard."

"A very interesting concept. Why was it rejected?"

The Human Connection

"The mainframe vendors went berserk when they heard about it. They feel the government should not abrogate the historic right of computer installations to set their own efficiency standards."

"The manufacturers are rather sensitive about the subject."

"I also strongly recommended information quality rebates to encourage the implementation of systems of real value to an organization and to insulate the users from the proliferation of unnecessary information and paper."

"Sounds good to me. What happened to that idea?"

"Well, the independent software development organizations and supplies producers organized an automobile caravan of protest. They filled more than 500 cars with bearded DP radicals and then circled the White House honking and yelling something about rebates encouraging foreign competition. The noise woke Amy from her afternoon nap. The next thing I knew, the proposition was scrapped."

"You sure have had some bad times."

"Then I proposed a federal excise tax on 'data guzzlers,' first- and second-generation machinery and software programs which constitute a major drain on our national programming and customer engineering resources."

"And — more of the same?"

"You've got it. Except here, the recent price cutting on third- and fourth-generation equipment is already doing the job of moving archaic installations to modernize."

"I can certainly sympathize with your mental state."

"But to cap it all off, I suggested that the President should be granted the power to allocate computer machinery to data-starved areas of the country."

"Is this a proper role for the federal government?"

"Of course it is. The government already has the constitutional power to redistribute national economic, social and natural resources among the various segments of our society. Isn't it fair and equitable that the Alaskan Eskimos should have the same access to computing resources as the natives of New York City?"

"I guess I never thought of it in quite that light."

"Well, the White House staff rather liked the idea. It turns out that they were searching for a new strategy to gain a stronger political base in the northern reaches of Alaska, and this idea seemed to have the right gestalt."

"But it didn't appear in the President's speeches."

"No, instead the staff organized the Presidential Commission on Citizens' Rights to Computational Facilities, headed up by Billy Carter, to study the problem."

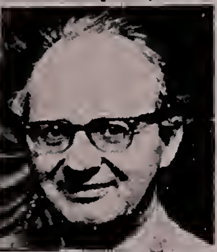
"Well, now, that's progress."

"I suppose so, except that the report is not due until just after the next election."

Airlines Make Advance With Overbooking Disclosure

It isn't often that I find something in my airline ticket envelope more interesting than my airline ticket. But recently I did, when American Airlines enclosed a "Disclosure Notice" about deliberate overbooking (see accompanying box).

The Taylor Report
By
Alan Taylor, CDP



There are a number of points about the notice which still are not really clean. If American Airlines issued the notice, it should have put its name on it. If someone else issued it and American distributed it, then American should have seen that the name of the issuer was on it.

In addition, some reason should have been given for the deliberate overbooking — perhaps even an expression of regret addressed to those denied boarding would have been in order. American apparently thinks otherwise.

These objections are minor beside the fact that notice of the airlines' deliberate overbooking policies is now being given before the traveler goes to the airport, if not before the confirmed seat is purchased.

This development is important to DP people for two reasons. First, it shows the way that problems resulting from computer strengths can be attacked and will be attacked in the future. Secondly, it shows the continuing problem of deliberate computerized overbooking — which can be expected for some time yet — has changed its nature, and we should distinguish today's problem from yesterday's.

Computer problems often arise from the strengths of their applications. This has certainly happened in the case of airline reservation systems; there is no doubt that more seats are delivered to passengers by overbooking than if no overbooking was being used. Both airlines and passengers generally have to thank the ability of computer systems to analyze the statistics, traffic patterns, even the old no-show ghost, and to come up with levels of overbooking which generally work out.

However, when all is said and done, it doesn't do much for the individual passenger who is thrown off a flight because of overbooking. While passengers in general may have benefited, the individual has been victimized.

Until now, he was victimized without notice, but that has changed. Still, the uncertainty continues, even if the deception is over. And uncertainty, as well as deception, must be faced.

In the past this victimization was without notice, and the compensation was a matter of chance, even though there were some rules about it introduced in recent years.

The first-level solution to the problem has now been seen. It consists of:

- Joint action between all the airlines so no one takes competitive advantage.
- Compensation for the individual who suffers, even though the public at large may have been given an advantage.
- Effective notice of danger, again given individually.
- Statistics of danger frequency published.

That's all, as far as I can see. And with those four aspects we will be able to overcome the problem of untrustworthiness occurring in just about any statistically optimized computer system.

DISCLOSURE NOTICE--DELIBERATE OVERBOOKING

Airline flights may be overbooked, and there is a slight chance that a seat will not be available on a flight for which a person has a confirmed reservation. A person denied boarding on a flight may be entitled to a compensatory payment. The rules for denied boarding compensation are available at all airport ticket counters.

This anonymously produced form is being distributed by American Airlines and presumably others in a new development which shows the way many DP operations will have to consider operating in the future.

So the message from the profession is that if you are going to produce inaccurate output occasionally because of use of some optimization techniques, then you should plan for these four elements.

The last element — information on how well the optimization and compensation techniques are working — is the area in which the airlines are still open to criticism. Currently, all they are disclosing is total incidence figures and bland generalities about how they decide when and by how much to overbook.

While this makes good public relations, it is basically uninformative as well as airline-centered. A wider outlook that would include victims as well as airlines and a more narrow scrutiny emphasizing what happens when boarding is denied would help everybody.

The next step is obviously that each actual boarding denial should be recorded and used in a data base to maximize the optimization and compensation techniques.

To a certain degree, this has already been done. Compensation is related to the amount of delay that occurs in getting the passenger to his destination.

But we still have no understanding on whether a flight which has produced overnight passenger delays is being overbooked as much as one which only delays people an hour or so. It shouldn't, of course, but the current statistics just don't discriminate between them.

To this extent, therefore, the optimization patterns may be simply to improve carrying capacity without aiming at reducing the cost of inevitable "failures." Failures, after all, are a part of the system just as much as successes are, and judgment should be made on both sides.

The failure-impact analysis, unlike the success-impact analysis, should be based upon the impact to the individual passenger denied boarding. It should consider items which are within the immediate knowledge of the airline (such as whether there was an advance warning possible of a nonstandard situation as expected cancellations failing to arrive as scheduled, whether the passenger bumped would have purchased a confirmed seat if one had been offered, whether passengers boarded were less hurt by the delay than passengers denied, how further legs were treated, etc.).

A whole host of independent studies aimed at minimizing the cost of failures and some level of publication of the existence and results of the studies will be needed to keep the public convinced the overbooking system is being used properly.

These, then, are the next steps for the airline systems. We should expect similar steps to be needed in all computerized optimization areas, so we should prepare for them.

For now, however, the key thing is to notice what the airlines have come up with as a solution to the general problem. It is a great advance upon the prior situation and may be taken as a measure of the impact that both professional and lay opinion has had over the past few years.

For this, we can all take pride in having curtailed the "blame the computer" syndrome once again.

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Schedule Pressures Wreak Some Wondrous Results

By Miles Benson
Special to Computerworld

The Sociology of Computing

Schedule pressures in the software world can be a compelling force. Some wondrous things have happened when schedules have been shoehorned onto normally sensible folk. Both wondrous good and wondrous bad.

This is a wondrous bad story. It's wondrous bad in the small sense — no big deal, no great splashing waste of money, just a little washing over the top of the fiscal trough by wave action. But wondrous bad, nevertheless.

Once upon a time — because this will be a fairy tale version of the story - there was a Kingdom which decided to build a giant bomber. This bomber was controlled by a real-time computer which gobbled up data and software and spit out control messages to the on-board crew.

In order to feed this voracious computer, another computer was used on the ground to prepare the nourishment for the one in the sky. Both computers hungered after software to control their operation, and a team of Royal Applications Programmers was kept to provide it.

Necessary Nourishment

Now, among the morsels of software needed by the ground support computer was an executive system to control its operation. This executive was, as it turned out, introverted and convoluted and perverse and obscure, with far-flung nooks and crannies unknown to its creators, and dungeons and towers where data resided for eons of microseconds without anyone being aware, and torture chambers called interrupt servicers from which both great activity and screams of anguish emerged.

And because of its perversity, it came to pass that when the Royal Applications Programmers needed it to exercise their budding application code, it was nowhere useful to behold, for its builders had fallen on hard times and were unable to meet the required schedule.

A crisis ensued. The Royal Managers met in closed castles and conferred on the meaning to them and their hungry computers of this schedule mishap. And from those closed castles, in addition to loud talking and fist pounding and irrelevant posturing, there finally issued forth a Decision. The Decision, said all of the participants, was just and right and good.

None of Those Things

But the Decision was none of those things, no matter how many times people said it was. For lo, the Decision was to build another, less tortured and less complete executive, one that the Royal Applications Programmers and other wizards of the ground support computer's console could use temporarily until the real thing came along.

Building another executive would use more of the King's jewels and more Royal Programmers than had been planned, and to no more useful purpose than to meet a schedule. But the schedule, which had been handed down on stone tablets and permitted no doubting, held the day, and the Decision, impure though it was, was carried forth.

Far into the night, the Royal Programmers chosen to build this new executive hammered and nailed and Fortraned and Macroed, and a crude but solid structure took shape. It would be named, they one and all decided, the Interim Checkout Executive.

And, as was the way of Royal Programmers in those times, they would call it by its nickname, ICE. (The Royal Jester pointed out that ICE was a watered down executive, but he was quickly told to stick to his juggling.)

Mighty Cheer

Not too long passed before the ICE code was ready for use. A mighty cheer arose from the Royal Applications Programmers, who had been sitting on their escape keys waiting for a way to test their Applications Programs.

ICE, for all its crudity and haste, was a four-square and useful tool, and the Royal Applications Programmers fell to their tasks with gusto and core dumps. Happiness reigned once more in the land.

But the Royal Programmers did not live happily ever after — yet. Although they did not know it, they were not yet shut of the problem of schedule pressures.

For the King, in a fit of concern for the number of his jewels which had already been cashiered into software, decided to conduct a Project Audit. And as his Project Auditor he chose the most thorough and persistent auditor in the land, Count von Bits.

Now the Count was a Well Structured Auditor; he was up on the latest in his technology. To get his Royal Audit off on the right foot, he sent for and received a copy of the System Requirements.

And it was while browsing through those requirements one day that he found, tucked away on a little-read page, a cryptic passage which he had to read thrice to fully comprehend.

"The Royal Frammis program," said the cryptic passage, "shall be capable of functioning alone, without the support of any executive program."

Simple But Vital

Now the Royal Frammis was a simple but vital component of the total software structure, and the cryptic passage (which had been overlooked in the earlier press of schedule problems) could not be ignored. Given that, the remaining conclusion was obvious, although distasteful.

The Royal Frammis had to contain, within its hallowed halls, its own private version of a support exec. Not the introverted and convoluted and oft-delayed Official Executive. Not the hastily erected but usable ICE. But another — yea, verily, another — version of an executive servicer!

Back to the Board

Wearily, the Royal Programmers trudged back to their coding pads and consoles to fashion one more executive program. And wearily, once again, they succeeded.

The day came when the Royal Frammis program, standing alone on the computer, read data and processed interrupts and wrote files just as if a real exec had been helping it.

And only then could the Royal Programmers live happily ever after.

The moral of the story? "The third time's a charm" is a cheap shot. "All that glitters is not ICE" is too facetious.

Perhaps, simply, "An executive a day keeps the schedule at bay"?

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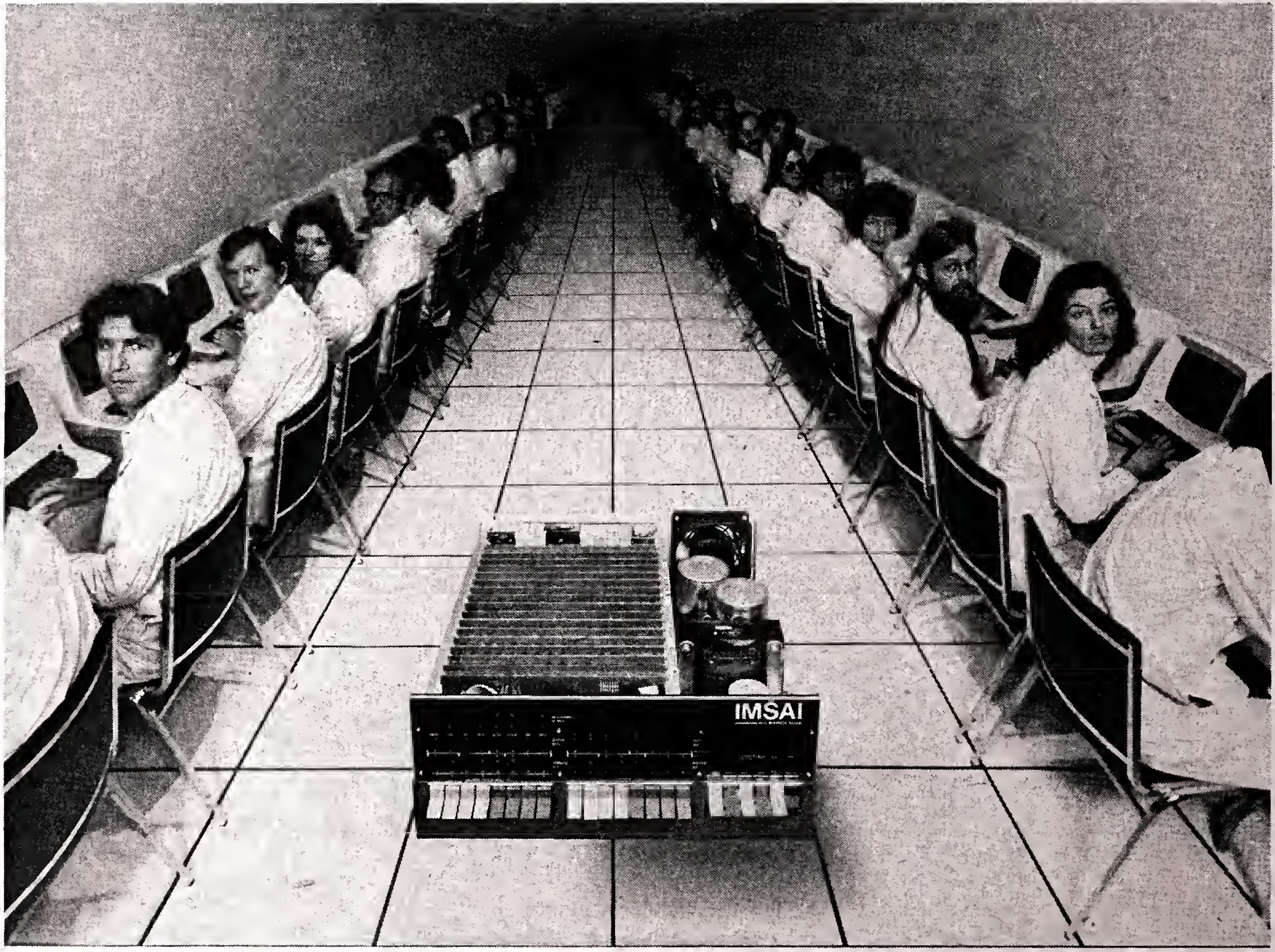

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Firm Finds Pressures Eased With Management Shift

By Don Leavitt
Of the CW Staff

NUTLEY, N.J. — Lack of control over major DP projects was a familiar story to the management information systems (MIS) division of Hoffman-LaRoche, Inc., a manufacturer of ethical drugs headquartered here.

But then the division began to manage people instead of projects, and that seemingly subtle shift in emphasis, according to Cliff Decker, manager of the Corporate Systems Group, has resulted in six major benefits:

- Reductions of more than 75% in the time involved in implementing systems projects, with corresponding reductions in cost.
- Minimal disruptions of user operations during implementation of systems projects.
- Greater user satisfaction with completed projects based upon increased user input during the planning and implementation processes.
- Dramatic productivity improvements within the MIS division.
- Heightened management confidence in the MIS division.
- A new attitude of confidence among project leaders within the division based on the knowledge that even the most complex systems projects can be controlled.

Projects can still be late, but now MIS personnel know precisely how late and why, Decker said. "Ballparking" new target dates is no longer necessary; delays, whatever their cause, are simply factored into an updated implementation plan. Users and others involved in projects are informed on the new status.

The key to the change in attitudes and to the resulting benefits from better project management, Decker said, were a series of productivity management seminars conducted by Keane Associates, Inc., a Boston-based software firm [CW, Dec. 13, 20].

Productivity management is grounded in six operating principles, applied in sequences:

- *Define the job in detail.* Computer experts and users must agree upon what each expects of the other.
- *Get the right people involved*: Personnel concerned with the system at every organizational level must be consulted, especially those who will use the system directly.
- *Estimate time and costs.* Such estimates are possible only after the job has been precisely defined and the project personnel identified.
- *Break the job down.* No single task within the project should take longer than 80 hours, or two man-weeks, from start to finish.
- *Set up change procedures.* Proposed changes must be evaluated to measure their potential impact, both positive and negative.
- *Agree on acceptance criteria.* Authorizations based on measurable progress minimize problems by making system acceptance an ongoing process..

"The seminars didn't tell us anything we didn't already know, but they were extremely helpful in reinforcing our own understanding of those project management principles," Decker said.

Decker is applying the six principles in a project involving the implementation of an order entry/order billing system at four of his company's distribution centers.

The four new systems were modeled after one installed in Branchburg, N.J. That system became operational more than two years ago, but the planning and implementation for it involved well over four years.

"We measured that involvement almost in terms of human lives. It was like 'Pork Chop Hill,' " he recalled.

By contrast, planning and implementation of the second system, in Decatur, Ga., took approximately six months thanks to application of the productivity management principles, Decker said.

The Human Connection

Installation of the third system, in Des Plaines, Ill., came approximately two months later, in accordance with the original project schedule. The manager said installations are scheduled to be made one week apart this spring at centers in San Leandro, Calif., and Dallas, Texas.

Hoffmann-LaRoche had targeted last Oct. 25 for installation of the system at Decatur. Late delivery from a hardware vendor set the project back approximately three weeks.

"Despite that delay, we and the people at the center felt the project was under control," Decker said. "We saw the new installation date conflicting with the Thanksgiving holiday and agreed with the user to postpone installation an extra week.

"Two years earlier, before we had put productivity management into practice, we had found ourselves working on Christmas Eve to get a job finished. The management procedures we use now are a lot more considerate of people and of reality."

The Decatur system became operational on Dec. 3, with a cost overrun of 9% attributable to additional time and travel expenses made necessary by the delivery delay. "Before we adopted our new approach, we had no way to measure our cost overruns because we had no effective means of measuring projects from beginning through completion," Decker noted.

The goals of the systems had evolved during the four years of work at Branchburg; nevertheless, each of the new projects began with development of a detailed list of tasks.

"After the Decatur list was completed, it was reviewed by the manager of that center. His input was extremely important because some aspects of the system are customized to meet each center's unique requirements.

"More important," Decker said, "virtually all of the manager's people were to be involved in the system planning process; users had to be included on the planning team."

With tasks arranged in assignable units by chronological sequence, it became relatively easy to assign the right people to each task following the second rule of productivity management, he said.

Part of the planning process involved negotiating with other departments over the jobs to be done, the people required for those jobs and the time commitments involved, he recalled. A detailed estimate of the costs involved in each step of the project was a by-product of the estimate of the time required for each task on the list.

The "80-hour" rule was violated only once during planning for the Decatur system, Decker said.

"We had had a project team of sorts since we began planning the system for Branchburg," he added, "but that team had

(Continued on Page 38)

'Robot' Answers Queries in Everyday English

KENSINGTON, Md. — The Robot package now available from Artificial Intelligence Corp. (AIC) was designed to allow managers, clerks and scientists or anyone else untrained in DP to work with a computer in everyday English, the vendor said.

Users can phrase their questions in any way they wish within the syntax of reasonable English, a spokesman claimed.

Robot has the ability of breaking down a user inquiry into small enough parts so it can determine the meaning in terms of its internal functions; after this it does the work required and interprets the results from the system or file structure back into English the user can easily understand, he said.

Expressed another way, Robot uses the installation's entire data base as an extension of its dictionary and translates user requests into the language of the data base management system. That system "makes the computer find the answer" and gives it to Robot, which passes it to the user.

Since Robot's functions are independent of file structure, data base organization and access method, the package can be easily adapted to data base management systems, the spokesman said.

Robot is said to work with files or data bases of any size. The upper limit is determined by system hardware and software, not by Robot, AIC stated.

Robot itself is written in PL/I, utilizes 110K bytes and should function under all IBM 360/370 environments, AIC said. Interfaces have already been developed for Applied Data Research, Inc.'s Roscoe, to Software AG's Adabas and to IBM's CICS and TSO, the company added.

Robot costs $30,000, AIC said from 3514 Plyers Mill Road, Kensington, Md. 20795.

'Disk' Operating System Ready for 8080, Z-80

PACIFIC GROVE, Calif. — CP/M, a "disk" operating system designed for use with IBM-compatible diskette-based systems that use an Intel 8080 or Zilog Z-80 microcomputer, is now generally available from Digital Research, a spokesman said.

The cost of a complete CP/M system in object code, with documentation, is $70; documentation by itself (six manuals) is $25.

The company can be reached through P.O. Box 579, Pacific Grove, Calif. 93950.

Systems Courses to Meet

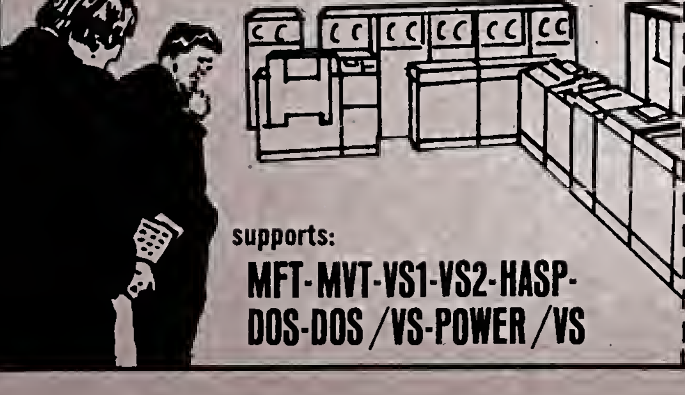
ANDOVER, Mass. — A five-day course on systems design and analysis developed by the U.K.'s National Computing Centre will be offered here next week and in New York the following week by Software International Corp.

The course content is not tied to use of any of Software International's products; it was designed to help any DP professional — from programmer through department manager — "dramatically" increase productivity by promoting understanding of basic systems and analysis concepts, a spokesman explained.

Aimed at developing the attendees' comprehension of how their respective companies do business and how systems designers can best put DP techniques to work for improved results, the course is structured around the case study method. It requires every student to participate in every aspect of a systems design problem.

Tuition is $550 per student and covers all course material, the spokesman noted.

Detailed information on location and time of the course sessions is available from Software International, Elm Sq., Andover, Mass. 01810.



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Addresses Maintained On-Line

SACRAMENTO, Calif.—The Mail package, now available from Software Module Marketing (SMM), was described by the vendor as an on-line terminal management system for maintaining hierarchically categorized name and address data bases under IBM's CICS.

Mail gives the on-line user the ability to add, delete or update category descriptions or individual fields in name and address records using an IBM 3277 Model 2 terminal linked to a 370 mainframe, SMM said.

Mail also allows the user to print any size labels which are one-, two-, three- or four-up. Constant information may be inserted on the labels if desired, a spokesman noted.

Production of labels can be based on single or multiple categories sorted together on any or all fields. Label lineup instructions and guides are printed at the beginning of the job, he said, to avoid destroying any labels.

Mail can be utilized with all versions of CICS, the spokesman claimed. The package costs $6,500 but lease/purchase plans are also available, he said from the Crocker Bank Building Penthouse, 1007 Seventh St., Sacramento, Calif. 95814.

Medical Appointments Managed

N. HOLLYWOOD, Calif.— An appointment-scheduling system for medical or dental groups or clinics with Datapoint equipment, Qtime from Occidental Computer Systems, Inc. (OCS) allows doctors to set parameters and predetermine their monthly work schedule, according to OCS.

Qtime operates on-line with a Datapoint 1100 diskette system or under Datashare time-sharing on a Datapoint 5500, OCS said.

Six-Minute Slots

With the package, each doctor's availability for appointments is displayed on the system's CRT screen and patients can be scheduled into six-minute time units, a spokesman noted.

Once an appointment is scheduled, pertinent data on the purpose of the visit is also entered. This information is then available to the doctors in a series of weekly reports and in charge tickets, outpatient labels and patient schedules, he said.

Written in Databus

Qtime is written in Datapoint's Databus and operates in 16K bytes. Source programs, test data and documentation cost $5,600.

Lease plans based on the number of doctors using the system are also available; OCS noted from 10202 Riverside Drive, N. Hollywood, Calif. 91602.

Support for Source Libraries Enhanced With 'Slick' Update

ATLANTA—Version 3 of the Slick source statement library system from NCI, Inc. is said to include a series of enhancements that provide the IBM 360/370 user with a better maintenance tool than was available previously.

In addition to four levels of assignable program security, Slick V3 supports a Return Code analysis that causes termination if an encountered error exceeds a user-specified severity level. This feature is available for both DOS and OS users, NCI noted.

A Dynamic Recall feature allows the reconstruction of previous program versions, while a history feature permits the printing of a complete "audit trail" of changes that account for the different program versions. In neither case is a special history file required to utilize these features, a spokesman said.

Instead of a history file per se, Slick V3 enables the user to trigger the "stamping" of source statements with any information that exists in the directory to provide an audit trail all the way to the object code, he explained.

As many as 36 secondary libraries on tape or disk can be handled by Slick V3; each can be processed generically, according to NCI. The system also supports a capability to move code between members and to build new members from portions of existing members without executing multiple steps, the spokesman added.

In addition, the Slick update includes a flexible load-and-go report writer, he said.

Slick V3 was designed to run under any operating environment on an IBM 360/370 mainframe and ranges in cost from $2,450 to $2,950 depending on the user environment; terms other than one-time purchase fees are available, the company said from 6075 Roswell Road, Atlanta, Ga. 30328.

'Renumf' Shows Fortran GOTOs That Break Into Logic Blocks

CORPUS CHRISTI, Texas — Release 2 of the Renumf Fortran programming aid package from Comp-Aid enables the IBM 360/370 user to segment modules of code into separate blocks which represent the series of single functions required to accomplish the module task, the vendor said.

Coupled with that enhancement, the package has the facility to recognize when a GOTO from one block addresses a location in another block. If the GOTO address is anywhere but the beginning of the other block, Renumf reports such "improper" GOTOs, according to a spokesman.

Even with these enhancements in place, Renumf has retained its basic role supporting the Fortran programmer, he stated. The package can renumber Fortran statements within a source deck, for example, starting at any number and at any increment the user specifies.

Renumf also lists the cross-references of the Fortran syntactic elements, the variable and subroutine/function names and the Fortran statement numbers, he continued.

The package can list both the user's input deck and the output deck in order to document what changes have been made by Renumf. The output can be punched into cards or stored on a temporary direct access or sequential file for subsequent Fortran G processing, Comp-Aid said

BCD Into Ebcdic

Comp-Aid has also extended the package so if INCODE=BCD is specified in the RENUMF EXEC PARM, all non-JCL cards following — whether option list control cards or Fortran source cards — can be in BCD and conversion to Ebcdic will be handled by the package.

Written in Fortran IV, except for some string-processing routines in ALC, Renumf runs on any IBM 360/370 supporting OS "or higher" operating systems. The package is available for a one-time license fee of $1,100, the company noted from 3330 Orlando St., Corpus Christi, Texas 78411.

Sharp Eases Airline Data Use

NEWPORT BEACH, Calif.— Airline analysts responsible for route planning, fleet planning and scheduling may find their work somewhat easier by using the Civil Aeronautics Board ER586 Service Segment data base, now available on the I.P. Sharp Associates remote-computing network.

The data base consists of detailed information about all scheduled commercial flights in the U.S. from 1973 to the present. Previously the information was available only in printed form, Sharp noted.

The data includes the number of available and occupied seats in each fare class and volumes of mail, freight and cargo as well as identification of the carrier, flight number and aircraft type. In all, 67 facts about each flight segment may be available, the Toronto-based vendor said.

The I.P. Sharp network can be accessed toll-free from any of 40 cities in the U.S. and another 40 in Canada and Europe.

More information about this particular data base is available from the Sharp office in Suite 1135, 610 Newport Center Drive, Newport Beach, Calif. 92660.

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Data Base Systems Differ From Data Base Packages

By Steve Robinson
Special to Computerworld

Data Base Corner

In this initial column, I'd like to distinguish between two often confused concepts: data base systems and data base packages.

What is a data base system? It is a philosophy for organizing a data base. What is a data base? An aggregate of the data elements which are, in toto, a model of an organization's activities.

Let me develop the concepts a bit more fully through examples.

Any organization spends considerable sums of money collecting data. Data is collected on forms, via terminals, via communication lines, on scribbled pieces of paper, directly from automatic sensor devices, etc. The classic way to organize data has been the "file system" approach.

In the file system approach, a file — whether on card, tape, disk, microfiche or in manila folders — is created for specific applications or application areas. For example, most companies have payroll files, personnel files and general ledger files.

A data element is regarded as belonging to an application. It is meaningful, therefore, to speak of multiple occurrences of an element such as an employee's address, e.g., the payroll file's address, the personnel file's address, the stock purchase file's address, etc., even though these may all be the same fields.

We can usually identify a life history for each of these addresses: how the address is initiated, how it might be updated, what reports it appears on and how it might be deleted or archived. All too frequently, these life histories may be quite independent of one another.

A very good case can be made for an address being an attribute of the entity employee. Taking such a view suggests that one should not have an address associated with each application.

Instead, one should treat the applications (payroll, personnel, stock purchase) as being additional attributes of the entity employee. An employee's address would then have a single life history, as it logically should.

This column will appear regularly, possibly every three weeks, and will alternate in style between tutorial discussions by Robinson and comments or questions from readers followed by Robinson's responses.

Letters should be addressed to Robinson, manager of data base technology, CACI, Inc.-Commercial, 75 Rockefeller Plaza, New York, N.Y. 10019.

That is representative of a data base system approach to organizing data. In a very real sense, it inverts the logic associated with the file system organizations. A data element has a set of attributes which include the systems that use the data element, rather than each system having the data element as an attribute.

The reasons for developing a data base system are relatively few in number. Users hope to gain more accurate, more timely and just plain more information while avoiding excessive, redundant file maintenance.

The purpose of data base systems is to supply decision makers with more and better information. In other words, the major bent of data base systems is to improve the quality of management information systems.

That is not to say that data base systems will not have any effect on standard operational information systems. If an attempt is being made to maintain interfile logic relationships, there will likely be excessive DP activity to effect the synchronization. A data base system organization will typically minimize (although not eliminate) such redundant activity.

Data base packages can be used to ease the creation of file systems as well as to develop data base systems. The following list is representative of the advantages in building file systems with a data base package:

- Intrafile information is more easily obtained.
- Less sorting is usually required.
- System development times are reduced (especially by the elimination of "utilities" development).
- Ad hoc querying can often be done without resorting to program writing.
- It is easier to modify data elements' characteristics (length, type, etc.).
- It is easier to add and delete fields from records.

A Fallacy

Often an assumption is made that a data base package can be used to build a file system and then, magically, the file system can be converted to a data base system. While this may be feasible in certain restricted situations, in general it is not a viable approach to the creation of a data base system.

Consider the following example from a banking environment. Separate files are created for the savings system and the demand deposit (checking) system. Separate processes exist to gather and maintain the names and addresses of customers.

A vice-president of the bank wishes to characterize those customers who have both types of accounts. He is not yet sure what types of questions he will want to ask, but they will probably be:

- How many customers have both types of accounts and an average savings balance of over $100?
- What is the average number of demand deposit transactions for such customers?

Linking the two files (explicit, or implicit via programming) would appear to be a logical way to provide the above capability. But what to link on?

With separate maintenance and data entry flows, it is unlikely that name and address fields would provide an altogether satisfactory coupling criterion. Although the Social Security number is now required for savings accounts, old accounts do not carry it and demand deposit accounts are still without it.

One could look at soundexing (phoneticization) for help, but it is still likely to be a long involved project to accomplish the requisite file coupling.

Potential Problems

Richard Nolan, writing in the September-October 1973 *Harvard Business Review*, presented a hypothetical scenario which I have seen many times in real life. An executive makes a request for information which transcends files. Back comes DP's answer: two to three weeks response time.

Why, says the executive, did we not just spend X dollars for a data base system?

(Continued on Page 38)

Teaching your computer to count cornflakes, cookies and whoppers.

A special report on *Source Data Entry* in the May 30th *Computerworld.*

A great deal of attention and effort has been directed toward automating the data entry process over the years. And it's easy to see why. The usefulness of your entire computer system is inextricably linked to the speed and reliability with which you convert raw data to machine-readable form. *Computerworld's* May 30th special report will be looking at just how far we've come with data entry — and, possibly, where we're going.

Edited by Frank Vaughan, this report will take a comprehensive look at source data entry methods, including:

- Places it's commonly used — supermarket check outs, airline reservation systems, hamburger stands, etc.
- A survey of contemporary equipment — scanners, POS registers, badge readers, mag stripe readers, key-tape and key-disk systems, the newer hybrid systems, and the emerging technology of voice data entry.
- An evaluation of the impact distributed data processing (DDP) is having on distributed data entry (DDE) — do these approaches dovetail or does DDP diminish the use of DDE? Are large scale, centralized data entry sites becoming obsolete?
- The state of the art — equipment speeds and technical trade-offs. Innovative applications like voice input and using the telephone as a terminal.
- What's ahead — Input from smaller users just getting into computer automation through data entry; e.g., how merchants regard the costs, projected savings, and their need for automated data entry methods. Possible impact on consumers.

If you're a DP manager, supervisor, or corporate manager who's concerned with the cost effectiveness of DP, be sure you read the special report on Source Data Entry in the May 30th *Computerworld*. If you manufacture and market data entry equipment you'll want to advertise here. Don't miss the May 13th ad closing date. Contact your *Computerworld* salesman — or call Terry Williams at (617) 965-5800.

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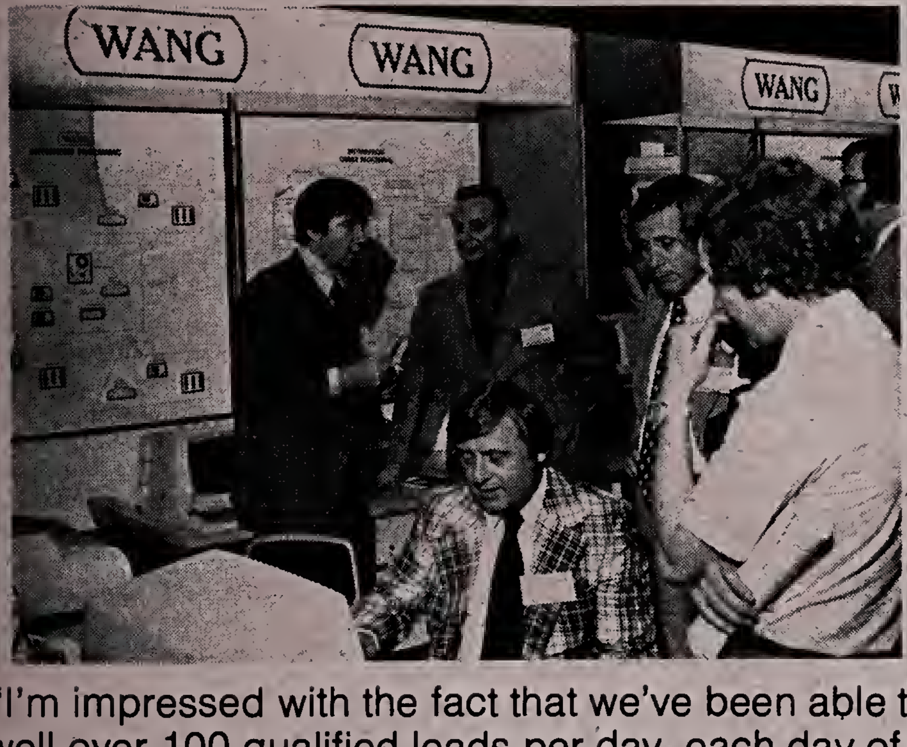

"I'm impressed with the fact that we've been able to identify well over 100 qualified leads per day, each day of the show this year. People at a very high level in corporations who either recommend, specify, or actually buy computer equipment are the people we meet at each Computer Expo. We are in the Caravan this year specifically to introduce to the public our two new products, the PCS II, and the WSC 25."

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IAP Ready for IBM System 34

ATLANTA — IBM's Distributor's Management Accounting System II (DMAS II) introduced with the System 34 was designed specifically for distributors who want to take advantage of the multiprogramming and on-line capabilities of the 34, IBM said.

Available in April 1978, DMAS II will offer billing, inventory control, accounts receivable and sales analysis modules. The modules can be installed separately or in combination, the firm noted.

Using the order entry modules, an operator enters the customer account data via the workstation. The system responds by displaying customer name and billing and shipping addresses along with standard order instructions.

The system will alert the operator of any credit limitations, IBM said.

Processing can be interrupted to look up current information that can affect the transaction, such as item availability or current list prices, IBM added. Each order can commit inventory, so succeeding transactions "reflect up-to-the-minute availability," the firm claimed.

The program also supplies status reports on items that move slowly or turn over rapidly as well as reports on profitability and volume of business by item, account and salesman.

The product will cost $50/mo for the billing modules, $45/mo each for inventory control and sales analysis and $35/mo for accounts receivable.

Project Pressure Eased With Management Shift

(Continued from Page 33)

dwindled in size. After attending the Keane seminars we were able to reconstruct the team more efficiently. Still, assembling the project team was one of the hardest parts of the project."

As a result of the seminars, Decker said he looked for people with backgrounds in order entry, billing and customer service in assembling the project team, training those people in the system to be installed instead of assembling persons with expertise in the equipment involved.

"The seminars also stressed the need to get users involved," Decker added, "and we were glad we did. The manager of the center at Branchburg, for example, helped the project by devising a better training outline than we could have devised ourselves."

According to Decker, requests for changes in system specifications are typically the most significant factor in project delays. Some 20 requests for system enhancements were received during planning for the Decatur system alone.

"This time, we agreed with the users beforehand that all requests for changes would be postponed until after the system was installed and running. We did make one exception and implemented an enhancement during the delay from the equipment delivery."

With change requests accounted for, each task associated with the project had a specified beginning and an end and, because those tasks were so well defined, it was obvious to MIS and the user when each task was completed.

"Acceptance criteria are normally a problem, but since we've applied productivity management, acceptance occurs each step of the way. Final acceptance constitutes an approval upon completion of the final task, not approval of the entire project."

Is it a System Or a Package?

(Continued from Page 36)

Well, yes, says the data base guru, but . . .

In deference to those readers who blanch at the mere description of violence, the ensuing bloodbath is not described.

It is important that persons responsible for the "data base effort" in an organization recognize whether they are building a data base system or using a data base package to build a file system. It is even more important that management be aware of the scope of the data base effort.

This column will be primarily concerned with the problems associated with data base systems. We shall, however, devote appropriate space to important aspects of data base packages, such as their selection and proper utilization.

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IDMS Tailored

WELLESLEY, Mass. — Cullinane Corp. has developed a banking-oriented version of its Integrated Data Base Management System (IDMS).

The package includes the IDMS Sequential Processing facility, an "Rdam bridge" for users of the University Computing Co.'s (UCC) banking application software and the standard IDMS facilities, Cullinane said.

The IDMS banking version will be available next month for approximately $15,000, depending on features chosen, the vendor said from 20 William St., Wellesley Office Park, Wellesley, Mass. 02181.

How to love DEC without marrying the whole family.

The PDP-11 is a real beauty. The CPU, that is. It's too bad we can't say the same for the peripheral members of the family. Especially the line printer. To us, it costs way too much, and it's hung-up on outdated technology.

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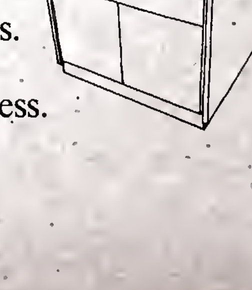

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For full details (including the names of BST users in your area), just call our toll-free number: (800) 854-3111. In California (714) 549-9961. Or write to: Business Systems Technology, Inc., 3015 Daimler Street, Santa Ana, California 92705.

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In Overall Performance

Independent Teleprinters Rated Higher Than Teletypes

By John P. Hebert
Of the CW Staff

DELRAN, N.J. — Users with Xerox Corp. and Diablo Corp. teleprinters are significantly more pleased with the overall performance of those terminals than Teletype Corp. users are with their terminals.

But even though more people are satisfied with teleprinters from other vendors than with Teletypes, the latter continue to be the ones most widely used, according to a Datapro Corp. report on them.

"All About Teleprinter Terminals" is an updated Datapro report that presents survey results of 232 users with 503 responses rating 7,287 installed terminals.

The 43-page document provides detailed specifications, including pricing, of 152 teleprinters from 57 vendors in 31 pages of comparison charts.

Users were asked to rate their teleprinters in terms of overall performance, ease of use, keyboard feel and usability, print quality, hardware reliability and vendor maintenance service, Datapro said.

Users rated each of the six categories with scores ranging from 1 for "poor" to 4 for "excellent."

In the category of overall performance, Xerox and Diablo units, each rated at 3.8, were closely followed by Centronics Data Computer Corp. and Digital Equipment Corp. teleprinters with 3.7 each.

Anderson Jacobson, Inc. and Texas Instruments, Inc. devices were rated next highest with 3.5 each, the survey report said.

IBM and Teletype, on the other hand, achieved scores well below many other vendors' teleprinters; the surveyed users gave each a rating of 3.1 in the overall performance category.

Even though users rated the Teletypes below the average in all six categories except maintenance (3.1 vs. 3.0 overall), their ubiquity was borne out by the survey's results — almost half of the installed units surveyed (3,052) were Model 33 automatic send/receive units.

The nearest contender for installed units within the survey's confines was General Electric Co., which was represented by 37 users with 703 devices, the report said.

In the area of hardware reliability, Centronics and Diablo shared the No. 1 spot with 3.7 ratings, while Computer Transceiver Systems followed with 3.6 and DEC and Xerox came next with 3.5.

An average of the weighted average scores in all six categories showed users of Centronics Data Computer Corp. teleprinters were the most satisfied group, although only 22 of the company's teleprinters were used by six users.

The four users with Xerox Corp. terminals rated their teleprinters second behind Centronics' 101 and 306 models' 3.6 six-category average with a 3.56 out of the possible total of 4.

Runners-up for all six categories, according to the surveyed users, were Diablo with a 3.55 and Digital Equipment Corp.'s Decwriter and other teleprinter models with a total of 3.42.

Survey results on teleprinter usage patterns showed a high reliance on time-sharing (75.5%) and inquiry/response applications (39.6%). Some users applied the teleprinters to more than one application, Datapro noted.

The report also noted 64.2% of the terminals used by those interviewed transmit data at a speed of 30 char./sec. Speeds of

(Continued on Page 44)

Buzzwords Become Reality — Part 1

Bank Building Net to Serve Statewide Community

The First National Bank of Lincoln, Neb., is developing a proprietary network to interface a statewide banking communications switch which is scheduled to be operational in July. When the network is completed, the bank will act as a service bureau for about 90 banks in the state.

The following article is the first in a two-part series detailing the equipment and capabilities of First National's banking services network. The second article will focus on front-end communications and back-end transaction processing, shadowed data bases, software and multiprocessor applications.

By James Cody
Special to Computerworld

A large bank computer center which provides on-line services to the Nebraska banking community is building its network around concepts that are only buzzwords for many communications users.

Protocol transparency, nonstop computing, front ending, back ending, shadowed data bases and multiprocessor applications are concepts which the First National Bank of Lincoln, Neb., is implementing on a variety of mainframes, minicomputers and microprocessors.

First National began in 1974 to build a statewide network for electronic banking services. By 1976, the network included dual Burroughs B4700 mainframes in Lincoln, smaller Burroughs systems at three regional item-processing centers, 200 Incoterm Corp. SPD 10/20 minicomputer CRT terminals and Docutel on-line automatic teller machines (ATM).

Line speeds are 4,800 bit/sec synchronous using Penril 4800B-1 modems on AT&T 3002 circuits. Multipoint communications extend through 20 telephone companies across 3,000 miles of leased lines which link 90 independent banks in 84 towns and cities.

But this, according to the bank's vice-president, Jerry Schmid, "was only laying the foundation for a broad range of electronic banking services that First National will begin offering in 1977."

Dual-Purpose CRTs

The 200 Incoterm minicomputer CRT terminals are programmed to perform the dual functions of a CRT workstation and a communications controller. They provide programmable CRT capabilities including inquiry into the customer data base, editing for real-time data entry and administrative message switching.

Communication with the Lincoln DP center can be at synchronous transmission speeds of 4,800- or 9,600 bit/sec using emulation of Burroughs multipoint protocols.

At the same time, each of these terminals can also function as the controller for a tributary network of other terminals which may utilize different line speeds and protocols.

Plans call for the SPD 10/20s to communicate at 1,200- or 1,800 bit/sec, asynchronously with manned teller machines such as Burroughs TT102 and NCR 751/279, on-line ATMs including those from Docutel and Diebold and point-of-sale terminals whose microprocessors will emulate Burroughs, NCR or IBM multipoint protocols.

Acting as the group controller for these devices, the SPD 10/20 will make differences in communications mode, line speeds and protocols transparent to the mainframes at First National's DP center.

It is noteworthy that the SPD 10/20 controller function does not disrupt the use of the keyboard and display for normal CRT operations. And because all software is down-line loaded from the Lincoln center, the bank can react immediately to equipment reconfigurations at remote sites.

(Continued on Page 44)

Megadata Introduces Universal Emulator Terminal

BOHEMIA, N.Y. — Megadata Corp. has introduced a universal emulating terminal system (UETS) which it said can replace different vendors' terminals used in large-scale networks.

The 700 UETS user-programmable CRT terminal can emulate "any five terminal protocols that can fit in its basic 12K, 8-bit byte programmable read-only memory" used for program storage, according to a spokesman.

Other protocols can be added as options, he said.

The intelligent terminal system is capable of IBM Binary Synchronous Communications (BSC) at switch-selectable transmission speeds of 150- to 9,600 bit/sec through a modem or 38.4 kbit/sec over hard-wired links, he added.

It can also operate under IBM's Synchronous Data Link Control (SDLC) and has RS-232 and RS-422 interfaces, a 12-bit microprocessor and a 126-key board that can include up to 71 function keys and 12 status indicators with an audible alarm, according to the spokesman.

Megadata 700

Because the UETS can replace a variety of terminals, operator training time is reduced and overall efficiency is enhanced because one basic operating procedure is utilized, the company claimed.

The terminal's program storage containing all operating parameters and telecommunications routines reportedly can be upgraded or changed in the event a user implements different host computers.

An additional memory section, Megadata said, can be provided for user programs.

In addition to interacting with a host CPU, the 700 can drive a printer, floppy disks and other peripherals. System diagnostics perform tests of disk operation, terminal memory and communications functions, the spokesman added.

The Megadata 700 UETS costs $9,550 to buy and includes the minimum of five protocol emulators, the spokesman stated from Megadata at 35 Orville Drive, Bohemia, N.Y. 11716.

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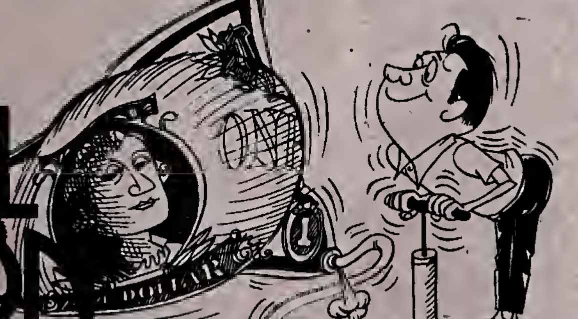

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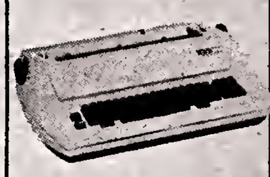

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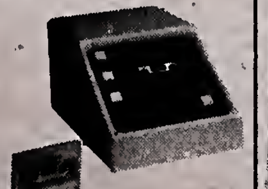

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IBM Gear Linked to Micros

HONOLULU — Adtech, Inc. has introduced a family of synchronous data communications interfaces for microcomputer systems to permit connection to standard IBM telecommunications hardware and software.

The interfaces reportedly provide a simple connection between the IMS Associates, Inc. Imsai/MITS Altair S100 microcomputer bus and mainframes using IBM's Binary Synchronous Communications (BSC) protocol.

Each interface can be inserted in a standard Imsai/Altair S100 bus with two card slots and communicates with a remote CPU using the BSC protocol through an RS-232C connection.

Each of the interfaces transfers data through direct memory access, which reportedly reduces both the programming effort and the host CPU's processing power.

The interfaces cost $1,595 each. The firm can be reached at P.O. Box 10415, Honolulu, Hawaii 96816.

Wholesaler Extends Processing Power By Using IBM CPU as RJE Terminal

Special to Computerworld

MILWAUKEE, Wis. — Century Hardware, Inc., a wholesale hardware firm headquartered here, was recently faced with the need for additional teleprocessing capabilities when its business expanded.

It traded one remote job entry (RJE) terminal for another with more processing power — an IBM 360/30 CPU equipped with a communications adapter.

"Like almost everyone else, our DP needs have grown by leaps and bounds in the last couple of years," according to Mike Nichols, director of management information systems for Century.

Century has six divisions, 11 branches and 350 employees, of which 250 are here.

"For over two years, we handled our own management and accounting reports using a Harris Corp. Cope remote job entry (RJE) terminal on-line to twin IBM 370/168s at a service bureau over full duplex, 9,600 bit/sec leased lines," Nichols said.

"But with the addition of 12 company-owned stores to our Government Division and the requirement for a detailed sales analysis for our customers, we were soon processing 300,000 to 400,000 cards per month.

"This forced us to begin additional processing at a second service bureau," he said.

Reviewed DP Needs

Century recognized the need for extensive new teleprocessing capabilities, but the company's DP costs were skyrocketing. "Then," Nichols said, "we called a halt and started an overall review of our DP needs — present and future.

"We reached the conclusion that continued use of an on-line system, along with additional stand-alone capabilities, would most effectively meet these needs."

Having made an extensive study, Nichols felt the worst was behind him with only the hardware selection left, but problems of cost and hardware availability had Century on the brink of scrubbing everything and starting over.

"It was then we heard about a product from Greyhound Computer Corp. that turns an IBM 360/30 into an RJE terminal with the stand-alone capability we need," he said.

Half the Price

The Greyhound Phoenix Integrated Communications Adapter (ICA) provides a communications controller equivalent to an IBM 2701 equipped with a Synchronous Data Adapter Type II — but at roughly half the price, Nichols stated.

"In June 1976, we installed the ICA, a 64K 360/30, two tape drives and Greyhound's own Phoenix disks and I/O set," he added.

"The ICA is the key to our system and we're happy to say we haven't had a failure since installation." A failure, he said, would idle all 250 people at Century headquarters.

"Even more important," Nichols added, "if and when we do have a failure, we shouldn't be down for more than five minutes. We can do the maintenance ourselves by simply replacing all the electronics on-site with a spare printed circuit board. The ICA/30 engineering is excellent," he commented.

"We are still on-line to the twin 168s, using the same modem and leased lines," he said.

For an additional $1,500 per month, Century doubled its printer output according to Nichols.

"Since our new ICA/30 system has tape input capability, we also installed a key-to-tape data entry system and did away with all those cards," he added.

The ICA/30 is currently supporting Century's data base reporting, inventory and customer listings; order processing and analysis; and a detailed general ledger audit.

In addition, the system has enabled the company to refine numerous other reports.

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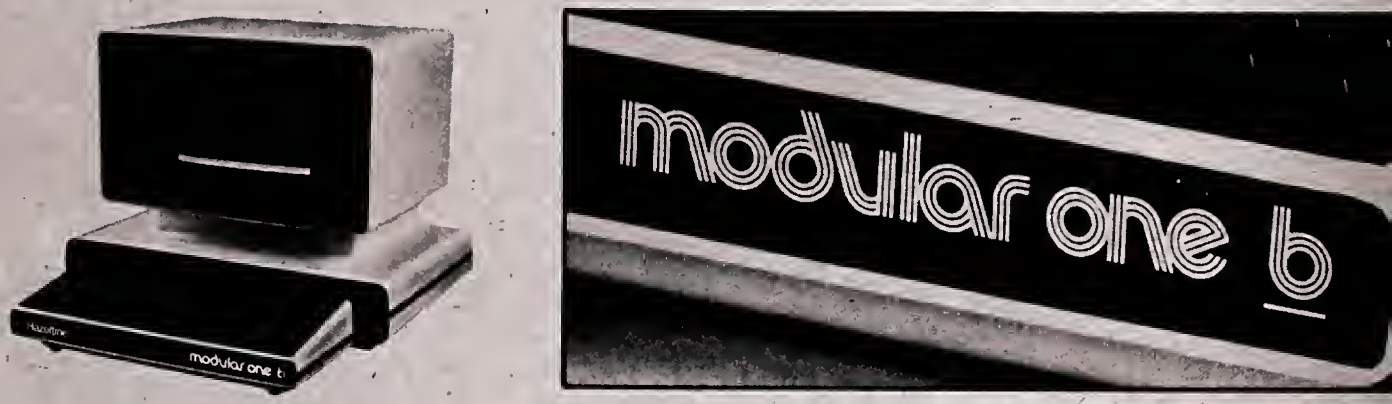

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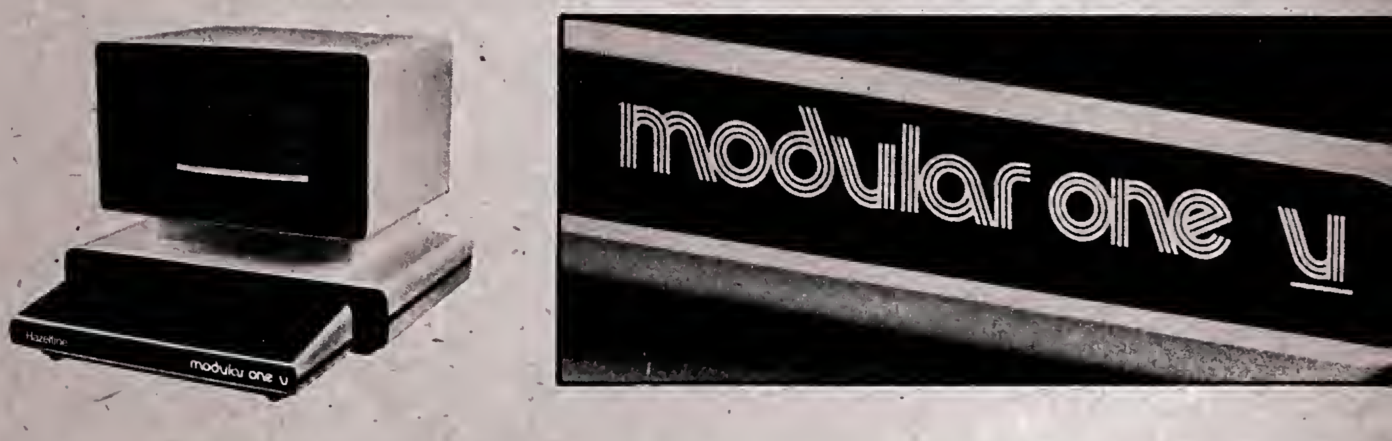

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Terminal Transactions

For Hardware and Software

Univac Enhances, Adds to Accuscan Checkout System

BLUE BELL, Pa. — Univac has added, changed and enhanced hardware and software features on its Accuscan supermarket checkout system.

The hardware enhancements consist of a touch keyboard, an intelligent register, a single minicomputer in-store system controller and a remote terminal controller.

The Accuscan data entry touch keyboard now has a centralized numeric pad and the "department" keys have been moved closer to the braille "home" position, Univac said.

In addition, the center row of numeric keys can be raised 3/66 in. to increase operator keying accuracy, a spokesman noted.

The intelligent register enhancement reportedly allows a supermarket to continue operation if the system controller fails. It features the ability to handle nine departments; the availability of up to 192 item records and velocity codes in an off-line mode; automatic tax calculation; and automatic transmission of data captured in the off-line mode, according to the firm.

The single minicomputer controller was designed for use with the intelligent registers. It has all the capabilities of the previous dual-controller configuration, but at about half the cost, the spokesman said.

The remote terminal control unit, which supplies the registers with intelligence, has been made smaller. The controllers are still used with the registers on a one-to-one basis, the spokesman noted.

The Time-in-Attendance application program allows the store controller to track and report employee hours with input through any register operating in attendance mode, Univac said.

Another, the File Interrogation program, reportedly allows the user to format reports and manipulate data fields. It can be used for creating specialized accounting reports and for exception reporting, Univac added.

A number of Header/Trailer message options have also been developed to allow suppression of that message type from the receipt tape by register, the company said.

The modular system with intelligent registers costs about $92,000 for an eight-lane configuration and $129,000 for a 12-lane version compared with $109,000 and $144,000 for the previous, fully duplexed configurations.

For key-entry supermarket environments, an Accuscan system with the keypad terminals costs about $42,000 for eight lanes and $55,000 for 12 lanes.

Univac can be reached at P.O. Box 500, Blue Bell, Pa. 19422.

Raytheon Package Backs Teleprinters Linked to PTS-100s

NORWOOD, Mass. — A terminal concentrator capability that reportedly can cut communications costs more than 50% by eliminating slow-speed teleprinter links has been designed by Raytheon Data Systems Co. for its PTS-100 series of programmable terminals.

The hardware/software package provides for transmissions up to 7,200 bit/sec and allows teletypewriters to emulate IBM 2260 and 3270 terminals, according to Raytheon.

Lines from as many as 20 teletypewriters can be attached to each PTS-100 system controller operating under either IBM emulation mode, it said.

The package is said to allow a combination of devices to operate on a single system for more efficient line utilization, lower communications costs and reduced CPU overhead, in addition to eliminating front-end hardware and processing support for teletypewriters, he added.

Capability Key

Microprogrammable general-purpose communications adapters, Raytheon said, are the key to the capability. Each adapter can control four half-duplex lines and a total of five adapters can be attached to each PTS-100 controller to concentrate messages from 20 teletypewriters into one full-duplex line, the company said.

The basic concentrator package, capable of handling four low-speed lines, adds $95 to the monthly rental of a PTS-100 configured for either 2260 or 3270 emulation over a one-year term, according to the firm.

The capability adds $2,400 to the purchase price of the same basic terminal. A minimum of 24K of memory is required to support the package, a spokesman noted.

Raytheon is located at 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.

Source 2200 Gets Ability To Read Three Bar Codes

COSTA MESA, Calif. — MSI Data Corp. has enhanced its MSI Source 2200 portable data terminal with the ability to optically scan three different bar codes.

The terminal can now be equipped to read the Universal Product Code (UPC), Codabar code and MSI's own code or to scan only one of the three, the company said.

The factory-installed three-way switch option raises the purchase cost of the 2200 scanning wand $190 to $960, a spokesman noted from MSI at 340 Fischer Ave., Costa Mesa, Calif. 92627.

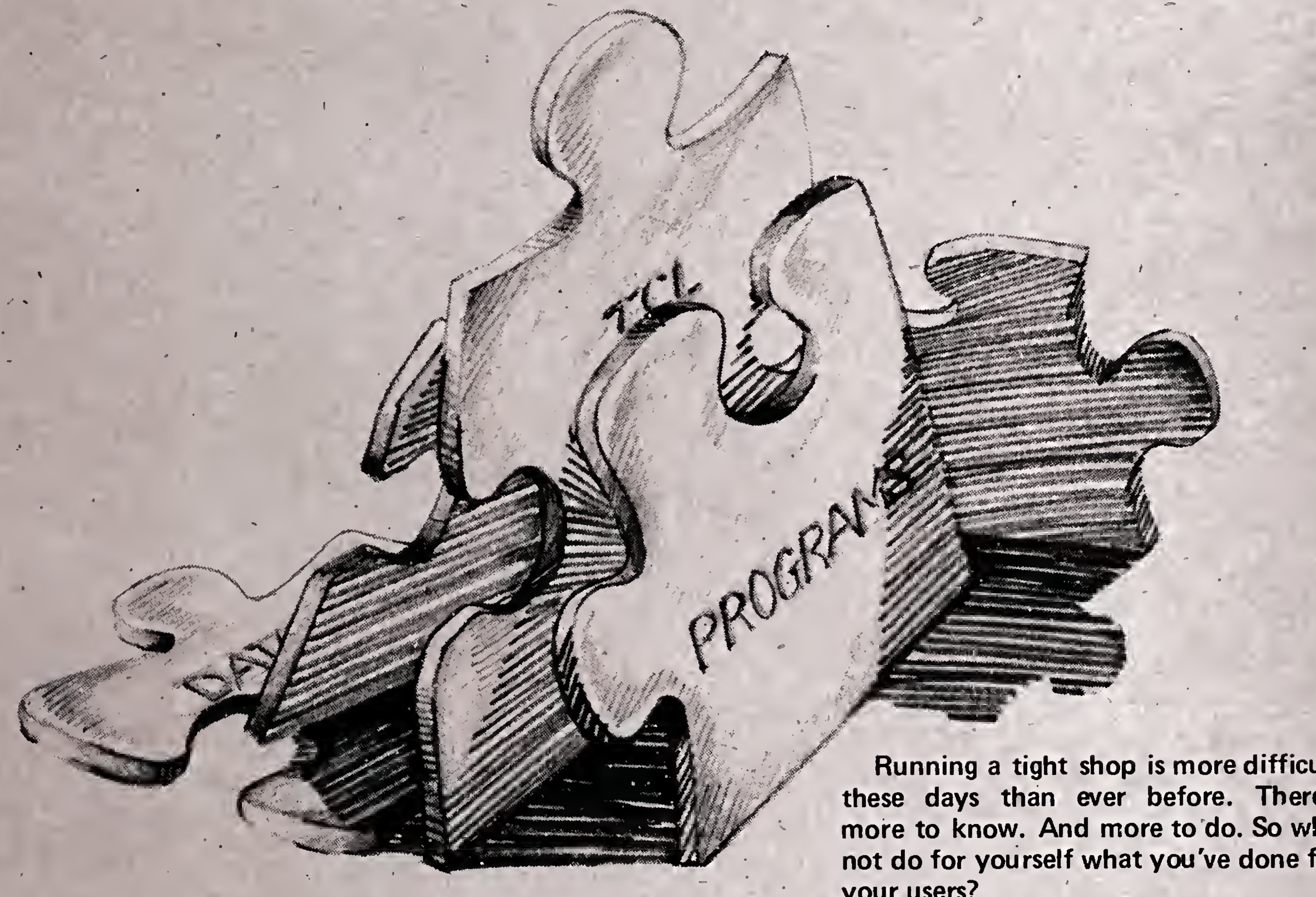
SAC Has Digitizer Link

SOUTHPORT, Conn. — The Model 1428 interface from Science Accessories Corp. (SAC) was designed to convert signals from teletypewriter-compatible current loop or RS-232-compatible devices to a SAC sonic graphics digitizer.

The interface provides a means of coupling two electronic components which are not otherwise compatible, SAC said.

The device costs $575 from SAC at 970 Kings Highway West, Southport, Conn. 06490.

Get It All Together...



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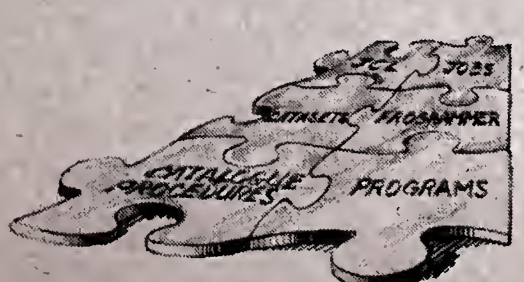

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Thomas Unveils Honeywell Emulator, I/O Subsystem

EMERYVILLE, Calif. — The Thomas Engineering Co. has introduced its first two products: a control unit which allows Honeywell VIP 7700 emulation for any RS-232-compatible peripheral and a serial I/O subsystem for the Intel Corp. SBC 80.

The company's Model 8770 control unit allows transparent data transmission to a Honeywell 62, 64, 66, 2000 or L6 mainframe through a synchronous line operating under Honeywell's VIP 7700 protocol at transmission speeds up to 9,600 bit/sec, the company said.

Data is sent from and received into semiconductor memory for processing by the Intel 8080 microcomputer within the 8770.

The basic controller contains a 16K-byte buffer, 4K of read-only memory and 1K of random-access memory, a Thomas spokesman noted.

In its most basic operating mode, the 8770 can connect any RS-232-compatible device to a Honeywell CPU, the spokesman claimed. Speed differences are compensated and text is passed to and from the mainframe unaltered, he said.

Buffering in the 8770 provides for queuing of a selectable volume of data to the terminal or other peripherals, he said. Up to 48K of buffer memory is available.

With the addition of "a small amount of firmware coding" supplied by the company at no cost, the standard interface is converted into a custom processor designed to provide an interface with Honeywell's Gcos Time-Sharing System (TSS), the spokesman claimed.

The 8770 costs $7,000 in the minimum 7-port configuration. The per-port price drops as more ports are added up to the maximum of 32, according to the spokesman.

Controllers to interface IBM and Univac Corp. CPUs are expected in the near future, he said.

The T8-S interface subsystem is designed to offer bulk serial I/O capability for Intel SBC series of microcomputers, according to the spokesman.

Eight independent RS-232C-compatible ports are available on the board to allow an interface to equipment using this standard, he said.

Each of the ports is capable of synchronous transmission to 56 kbit/sec with a modem and asynchronous transmission for selection of speeds from 50- to 9,600 bit/sec, the firm added.

To make programming of multiple channels simpler, status registers are available, the spokesman said.

The T8-S subsystem is supplied with all cables and jumpers to plug into the SBC 80 cardcage and RS-232 interfaces.

It costs about $1,500 in its basic form, the spokesman said from 1201 Park Ave., Emeryville, Calif. 94608.

Bank Building Statewide Net

(Continued from Page 39)

Because of the need for uninterrupted, around-the-clock, on-line services, First National is converting to a nonstop computer configuration at its Lincoln DP center.

The workload will be distributed between five interconnected processors: two shared-disk Burroughs B4700 computers and three Tandem Nonstop computers from Tandem Computers, Inc.

The on-line data base will be divided so the shared-disk Burroughs computers maintain all customer information except account balances and control data required for on-line financial transactions.

The Tandem computers will maintain two separate but identical data bases consisting of the financial data necessary for electronic funds transfer and other on-line accounting transactions.

Functional redundancy is planned on three levels to minimize the single-point-of-failure syndrome which plagues on-line networks.

The two B4700s will back each other up for traditional mainframe tasks, including real-time maintenance of all nonfinancial data base elements.

The nonstop architecture of the Tandem computers will permit three processors to act as four so two concurrent levels of front-end processing and two concurrent levels of back-end financial transaction processing can be simultaneously active.

The five-processor configuration will therefore provide dual Tandem front ending for the two Burroughs mainframes and for the dual Tandem back ends.

In the future, because the multiprocessor operating system and hardware architecture of Tandem systems permit the integration of up to 16 processors, the bank believes it can expand economically in the areas most exposed to growth: front ending and back ending.

Cody is president of Applied Communications, Inc., a software house based in Omaha, Neb., that is supplying software for the Tandem and Incoterm systems used in the network.

Teletype Rated Less Than Others' Units

(Continued from Page 39)

10- and 15 char./sec are common to 31% and 17.1% of these users respectively.

This is in contrast to Datapro teleprinter survey results released early in 1975 in which only 43.2% of surveyed users transmitted data at 30 char./sec, 35.2% at 15 char./sec and 40.2% at 10 char./sec.

Print quality has also changed substantially, according to users surveyed.

In 1975 IBM received the best rating for print quality — 3.1 — while in this most recent survey its rating remained unchanged but 11 other vendors' teleprinters achieved print quality ratings of 3.2 or more. A few devices had perfect scores.

While the report detailed the characteristics of 152 teleprinters from 57 vendors, it isolated a final field of 24 vendors' devices for close inspection. Other manufacturers' teleprinters were batched in an "others" category.

"All About Teleprinter Terminals" also addresses the pros and cons of teleprinters vs. alphanumeric display terminals, the trade-offs between impact and nonimpact printers, printer types and trends and the makeup of the teleprinter industry and its anticipated growth, the research firm said.

It is available for $12 per copy from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

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The perfect editing terminal for transaction processing must be more than a little bit smart. It has to be wise like our OWL-1200. With features that assure high accuracy source data entry, fast data editing, simplified host computer programming, and reduced host computer loading.

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Check the comparison chart of editing terminals to see all the reasons why the OWL-1200 is simply "incomparable."

		PERKIN-ELMER	HAZELTINE	LEAR SIEGLER		ADDS
USER REQUIREMENT	FEATURES	OWL-1200	MOD. 1 EDITING	ADM-1A	ADM-2	980
High Operator Data Entry Accuracy	Protected fields	Yes	Yes	Yes	Yes	Yes
	Low-intensity fields	Yes	Yes	Partial	Partial	Partial
	Numeric only fields	Yes	Yes	No	No	No
	Inverse video fields	Yes	Yes	No	No	No
	Blink fields	Yes	Yes	No	Yes	Yes
	Line drawing capability	Yes	No	No	No	Yes
Simple, Fast Editing of Data	Insert/delete character	Yes	Yes	Partial[1]	Yes	Yes
	Insert/delete line	Yes	Yes	Partial[1]	Yes	Yes
Minimized Loading on Host Computer	Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header.	Yes	No	No	No	No
Simplified Programming	Ability of host CPU to read device status	Yes	No	No	No	No
	Ability of host CPU to read device mode key settings and communication option straps	Yes	No	No	No	No
	Program override on mode key settings	Yes	No	No	Yes	No
Simplified Program Debugging	Transparent mode permits all characters to be displayed	Yes	No	No	No	No
Cost Effectiveness	OEM price in quantities of 25*	$1496	$1670	$1795 * $1595	$2395 * $2095	$1995

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters.

[1] No Key. Requires Two Key Code.

* Just announced price changes

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Programmable CRT System Aimed at Large Data Entry Sites

SANTA CLARA, Calif. — Zentec Corp. has introduced a user-programmable CRT terminal system aimed at the large site's data entry, text editing and word processing applications.

The Zentec 9003 intelligent terminal consists of a general-purpose keyboard, a 25-line by 80-char. CRT display console and an asynchronous interface under control of the unit's microcomputer, according to the firm.

Its flexible bus architecture reportedly permits the addition of memory and peripherals such as floppy disks, printers and other communications interfaces.

The memory ranges from 6K bytes in the basic terminal to 65K bytes of various combinations of read-only, programmable read-only and random-access memories, Zentec said.

Standard asynchronous transmission speeds are from 110- to 9,600 bit/sec, although the company said it can supply a synchronous interface which can operate at 19.2K bit/sec.

The interface is also programmable, enabling protocols to be easily changed under microprocessor control, Zentec added.

The basic 9003 costs about $2,750 each in quantities of 50, while a fully loaded system with all peripherals costs approximately $12,000 in the same quantities, according to a spokesman.

Zentec stressed it is reluctant to sell single quantities of the terminal.

The company is located at 2400 Walsh Ave. Santa Clara, Calif. 95050.

Ann Arbor CRT Graphics Options Allows Display on TV Monitors

ANN ARBOR, Mich. — Ann Arbor Terminals, Inc. Model 2480 CRTs are now available with a graphics option which reportedly provides a means of displaying graphics and alphanumeric data on conventional black-and-white (B/W) or color television monitors.

Two versions of the option are available: a Design III desktop unit including a B/W monitor and keyboard and a Series 200 modular case housing the graphics controller only for use with free-standing monitors and keyboards.

Graphics symbols are displayed in a full-character field, eight dots wide and from 0-to 10 TV lines high, according to the company.

They may be displayed in any one of seven colors plus blinking red on red/blue/green color monitors or in white, bright or blinking bright on B/W sets, the company added.

An RS-232 interface is a standard feature, while current loop interfaces are optionally available.

Prices begin at $1,395 for the controller only and $2,045 for the complete Design III 2480 terminal.

Either version of the option has a delivery schedule of 12 weeks, the company said from 6107 Jackson Road, Ann Arbor, Mich. 48103.

Azurdata Introduces Scorepad Terminals

RICHLAND, Wash. — Azurdata, Inc. has introduced a series of portable source data entry communications terminals suited for wholesale and retail applications.

Scorepad can transmit data over voice-grade telephone lines, uses a standard 8-bit Ascii code, can interface with most computerized order entry systems and has an optional MSI Data Corp. feature, according to a spokesman.

The clipboard-style terminal has a microprocessor, modem for half-duplex transmission, program storage read-only memory and 8K of random access memory (RAM), the spokesman said.

Expandable MOS Memory

The RAM MOS memory is optionally expandable to 88K char. in 8K increments. The use of MOS memory eliminates the need for external tape recorders, he noted.

A battery pack, LED display and keyboard are included with the basic terminal. A transmitter muff, battery charger and scanning wand can be used with the terminal, the spokesman added.

Scorepad's battery pack can be used continuously for eight hours and has built-in low-power warnings and low-power memory protection, according to the firm.

Optical scanning is also available to read Universal Product Code, Plessey code and Monarch Codabar labels, including Codabar labels that require a 31-char. field.

Prices for the Scorepad terminal range from $900 to $3,500 depending on options.

Azurdata allows up to a $300 trade-in allowance for an operable, in-service, competitive unit, the spokesman said from 1100 Jadwin Ave., Richland, Wash. 99352.

Typewriter Enables Link To Teletypewriters, Nets

HAUPPAUGE, N.Y. — The Redactron Corp.'s Readactor communicating typewriter reportedly can communicate with similar devices, computers or teletypewriters over the public switched network or other national or international networks.

And when it's not communicating, the Redactor typewriter can be used for word processing applications, according to Redactron.

The typewriter system gives a higher quality print than other terminals and uses magnetic media rather than paper tape, a Redactron spokesman stated.

Five communications modes are available with the typewriter; conversational (15 char./sec), 10 char./sec TWX mode, 6.6 char./sec Telex mode, 10 char./sec teletypewriter mode, and a 150- to 300 char./sec high-speed batch (HSB) version for point-to-point and volume transmission over the dial network, he said.

The base price for the Redactor power communicating typewriter equipped for conversational mode costs $7,734, while a machine equipped with the HSB, conversational and Telex modes costs $9,600. Redactron is located at 100 Parkway Drive South, Hauppauge, N.Y. 11787.

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All that is in the past.

DECwriter's new ASR capability is completely solid-state. And it can store from 4K to 16K of data—the equivalent of 30 to 120 feet of punched paper tape.

With it, you can prepare, edit, update and store data off-line for batch transmission up to 300 baud. This store and forward capacity saves you communications charges and, in DP applications, computer time. In fact, our new ASR capability will pay for itself in line fees in about 4 months of average use.

Besides being more reliable, faster and more economical than paper tape, it's also much easier to operate. Instructions are self-cueing and, in simple English, so most people can use it without much training time.

There's more. Because it's small, our new ASR capability inserts easily into the base of all existing DECwriter IIs. It has its own power supply, EIA port and is compatible with modem and x-on/x-off protocol.

The DECwriter II with our new ASR capability.

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For more details, write Components Group, Digital Equipment Corporation, One Iron Way, Marlborough, Mass. 01752. Or dial 800-225-9480 toll free (617-481-7400 ext. 6082). Canada: Digital Equipment of Canada, Ltd. Europe: 81 Route de l'Aire, 1211 Geneva 26, Tel. 42 79 50.

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And Boosts Multiprocessor's Capacity

Check-Processing Control System Cuts Bank's Rejects

SEATTLE — The National Bank of Commerce, Rainier here recently increased its mainframe's processing capacity and experienced a sharp drop in the number of document rejects after it installed a check-processing control system.

Using an IBM multiprocessor 370/158 for its computing needs, Rainier recently increased its system capabilities through implementation of the IBM Check-Processing Control System (CPCS), using IBM 3890 document processors. CPCS and the 3890s became operational at the bank in June 1976 and replaced several small, bank-developed capture systems which had used the IBM 1419 reader/sorter.

"Increasing document volumes were putting a severe strain on our previous capture systems and equipment," according to Rick Haines, vice-president and manager of information systems. "In addition, we desired to be more progressive in employing technological advances which would allow us to be more responsive to the needs of our corporate and non-corporate clients."

'Reconditioned' Rejects

"Our greatest benefit operationally is the decrease in rejects," a Rainier spokesman added. The 3890s process an average of about 725,000 documents daily, but recently they processed an all-time high of 1.2 million documents in a single day, he said.

Slightly less than 2% of these items are rejected on the initial pass. These rejected items are "reconditioned" and passed back through the system, using the reject reentry feature of CPCS.

About 50% of these items are then recaptured. Data from the remaining 50% that were not captured is entered by an operator via a CRT terminal on-line to the computer.

Reject Rate Reduced

"We have significantly reduced our net reject rate from about 2.5% to an average .8%, Haines said, "because the 3890 has a lower reject rate than older reader/sorters, and the reject reentry feature of CPCS makes high speed recapture possible.

"This reject reduction has allowed us to eliminate four positions in key entry and an additional position in shift balancing," he noted.

"Because of the 3890, when we receive our unqualified items from the clearing and Federal Reserve Banks, we're able to successfully capture 70% of them without any document repair prior to the capture. We do not recondition the documents; we only pull out the completely mutilated ones," he added.

Before CPCS and the 3890s, Rainier Bank's Adjustment Department had a three-month backlog of transactions. In the last two and a half months, the backlog has been reduced to three weeks and soon the Adjustment Department will be operating on a current basis.

"We've perceived, but not yet documented, an increase in availability of funds due to the larger number of kills possible on the prime pass," Haines said. "The 24 pockets of the 3890 enable us to program 21 end points on the prime pass; we've therefore increased the dollar volume of checks that we can 'get out the door' by 9:30 every night.

"That is a deadline for us since after that the availability of airline service to the East and Midwest is very limited. The greater the dollar volume we can get out the door by 9:30 p.m., the greater is our potential for increased funds availability.

"Improved service to our clients is possible by faster clearing of checks, ready availability of funds and a shortened response time to their inquiries about specific checks or documents," he said.

"A main advantage of CPCS is that it provides a single point of control for all checks and internal documents," the spokesman noted. "It has unified the standard for check processing because this one system has replaced several of our smaller ones.

"Before CPCS," he recalled, "we were missing deadlines, we had lots of holdover captures, we couldn't get checks out and we missed availability of funds."

As each document is captured on the 3890, data is entered on a computer file. CPCS can reapply rejects to the proper location in the files, eliminating the biggest problem in balancing the document batches.

In the old systems, the rejects were never reapplied to the file; they were handled by hand.

"Our data used to be scattered in

(Continued on Page 50)

Free Service Evaluates Tape Maintenance

By Frank Vaughan
Of the CW Staff

WOODLAND HILLS, Calif. — How well a DP shop maintains its magnetic tape media has an overall effect on the quality of work it performs. Evaluating this tape maintenance can be a difficult or confusing task for the DP manager.

One way some DP managers are checking out their media maintenance is through a free analysis program offered by Data Devices International here.

One such user of this service was Mike Adams, manager of computer operations for the Bradford Corp. in Los Angeles. He filled out a questionnaire that examined the characteristics of his tape library.

In the questionnaire, Adams indicated his library consisted of 5,000 reels with an average age of three years. He uses 9-track, 800- or 1,600 bit/in. formats and anticipates a growth of 1,500 reels a year for the next two years.

Adams' operation consists of 800 to 1,000 mounts a day, six days a week, and he expects a 30% increase in volume during the next year.

The tape librarian at Bradford performed the tape maintenance for Adams, cleaning an average of 300 reels a month. Tapes were selected for cleaning after completing 10 passes.

Approximately 100 reels a year were scrapped or replaced because of tape errors, Adams told Data Devices.

For tape cleaning, the librarian used a six-year-old Kybe Corp. E-24 cleaner/rewinder that did not have a capability to test the tapes.

Analysis Results

As a result of the information that Adams provided on the questionnaire, Data Devices determined he had a cost of 3.9 cent/error for his DP operation.

It advised Adams to purchase a new tape when the number of errors per tape exceeds seven. These tape errors could be edge damage, missing oxide, stretch marks, cinches, wrinkles, scratches or other physical defects not correctable by tape cleaning.

The high level of activity in Adams' tape library requires that it be maintained at peak efficiency, according to the analysis. Tapes should be cleaned after every 10 mounts and evaluated after every 20 mounts, the evaluation recommended.

Tapes with less than four errors should be used for critical or high-volume applications, tapes with more than four and less than seven errors in production and programming applications and those with more than seven errors should be repaired if possible, the evaluation suggested.

Based upon the cost per error rate for Adams' operation and the average number of errors per tape that Data Devices has found to be standard in most libraries, errors were costing more than $100,000 a year in lost CPU time, the service told the user.

The evaluation suggested Adams could salvage many of the 100 tapes he is forced to dispose of each year and recommended he upgrade his equipment to include both a full-time cleaner and a full-time evaluator.

The report indicated supplies alone for the Kybe cleaner cost $624 a year, but indicated Adams could continue to use the Kybe. Data Devices also noted it felt its Mark IV would be a decided improvement and pointed out that Adams could receive a trade-in allowance for his old cleaner.

"I feel that the things that they brought up were pretty accurate and I generally agreed with what they had to say," Adams said. As a result of the evaluation, he was able to reexamine his maintenance program and eventually purchase a new cleaner and evaluator in addition to adopting many of the suggestions.

The analysis and a brochure describing Data Device's tape maintenance equipment is available from the firm at 6301 DeSoto Ave., Woodland Hills, Calif. 91364.

Centronics Introduces Printer Family

HUDSON, N.H. — Centronics Data Computer Corp. has introduced a family of character line printers featuring an operator-interchangeable print band and microprocessor electronics at prices up to 40% less than comparable competitive models, the firm claimed.

The 6000 series is composed of four models which operate at 75-, 150-, 300- or 600 line/min. They share an 85% parts commonality, Centronics said.

All models in the series produce fully formed character printouts using back impact printing, a spokesman noted.

The one-piece lightweight print band has etched characters for long life and is operator-changeable within a minute, he said. Several font sizes (48, 64, 96 and 128 characters) and styles are available.

The use of Intel Corp. microprocessor electronics in the 6000 series provides simple operator controls and increased configuration flexibility, he claimed.

Print quality is consistent on one- to six-part forms through use of an adjustable density control, and an operator phasing control ensures character uniformity.

Models in the 6000 series feature a cassette ribbon and utilize a Mobius loop for optimum ribbon life. The cassette ribbon eliminates time-consuming threading, according to the spokesman.

Each member in the series accommodates forms 4- to 19-in. wide and prints 132 char./line. A standard 6 line/in. density is used with 8 line/in. density optional.

The paper is moved in a vertical direction at 15 in./sec and is stacked in a paper tray at the rear of the printer.

Additional standard features include a nonshifting hammer mechanism, modular two-part mechanism design, universal power supply, test print, automatic motor control, forms-feed control, single-line feed control, out-of-paper sensor and two-channel direct access VFU.

Optional features include electronic VFU for automatic recording and utilization of two, eight or 12 channels of format instructions; paper-jam sensor to terminate printing in unattended operation; line counter for monitoring printer usage; 136-column capacity for specialized applications; and custom parallel and serial interfaces.

Initial deliveries of the 6000 series are slated to begin in October. Prices are $4,050 for the Model 6075, $4,500 for the Model 6150, $5,350 for the Model 6300 and $7,600 for the Model 6600.

Additional print bands cost $350 each from the firm in Hudson, N.H. 03051.

'You Just Can't Beat Perfect'

SAN ANTONIO, Texas — "You just can't beat perfect," city clerk Garland Jackson said when asked how well a mainframe at the heart of an on-line election system performed in the City Council election here last month.

As soon as the polls closed at 7 p.m., the absentee vote was entered into the system. A short time later, election officials from each polling place began to converge on City Hall with their official precinct results.

Two hours and 15 minutes later, all returns were in and the final results were available.

"We probably could have finished earlier, but one election official didn't show up at City Hall until 9:15 p.m.," Jackson remarked. "As soon as that precinct was entered, the final results were known. This sure beats our old manual methods, which took four to five hours to tabulate."

The following Monday, the City Council took an official canvass of the vote and found no errors in the tabulation despite the fact that over 113,000 votes were cast.

Because of the election by districts, Jackson expected a heavy voter turnout. He asked the staff of the City-City Water Board Consolidated DP Center to develop a system to help speed the tabulation of the votes.

The DP center's staff developed an on-line system using IBM 3277 terminals connected to the center's IBM 370/145. Two terminals were used for entry of the official returns from each of the 199 precincts. Two other terminals and a 3286 printer were used by the media for up-to-the-minute election results.

A batch reporting system was also used to print the election results every 20 minutes.

In the final runoff election more recently, the same degree of accuracy was afforded and the totals were all tabulated and finalized in two hours, Jackson said. As an added feature in the runoff, the real-time results were projected onto a 5- by 7-foot screen so interested observers would not have to crowd around the printer.

Net Shared by Five Airlines

'Genie' Serving Eastern Airlines' Information Needs

MIAMI, Fla.— Eastern Airlines here is using a large mainframe to support a nationwide 4,000-terminal communications network that is shared by four other airlines.

The network, which is used primarily as a reservations tool, is also being used as a "news bureau" of sorts, with several categories of freeform information available to the users.

Tagged "Genie" by Eastern programmers, the system has not yet reached its full capacity for information retrieval, according to an Eastern spokesman. It is currently being utilized in only five of its eventual 36 indexed categories of information.

Genie's value was realistically measured during this winter's thrashing of the Buffalo, N.Y., area, the spokesman said.

An agent input a request on a CRT for information about Buffalo and received the following output:

```
EXPECTING ROUTINE OPERATIONS.
TRAVEL BAN IN CITY OF BUFFALO HAS
BEEN LIFTED. MAIN ROADS OPEN. MANY
SECONDARY STREETS REMAIN CLOSED.
ONLY LIMITED PARKING AVAILABLE AT
AIRPORT. ADVISE PASSENGER TO HAVE
SOMEONE BRING TO AIRPORT OR USE TAXI.
BUFFALO FIELD PLANS TO CLOSE FOR ONE
HOUR AT 5 P.M. FOR SNOW REMOVAL.
```

Another dated message pinpointed a flight problem at Tampa, Fla., where Eastern operations cancelled a flight because of servicing and placed the passengers on either another carrier or one of its later flights.

Through the supplementary information on Genie, users were able to monitor the system just as the situation unfolded, the spokesman noted.

In addition to providing information on field conditions, overflown related services, Genie provides information on flights and passenger dispositions, explains excursion fares, warns of tariff changes, displays movie timetables and provides availability on rental car requests, the spokesman added.

"In the past, some reservations agents weren't aware of the company's tour ads in the daily paper, which irritated them when customers called in for details," the spokesman noted. "However, through Genie's short notice update system, an agent can pull up information between calls."

Genie's heart is an IBM 370/195 with "3 million megabytes" of memory operating under an airline control program. The mainframe is supporting a 4,000-terminal system consisting primarily of Raytheon Co. PTS-100 CRTs.

The Raytheon units are being phased in to replace IBM 2915 and 4505 terminals.

"The system is so fine, we regularly receive requests for more input," the spokesman noted. Formerly, with so many bits and pieces of changes, amendment and departmental news floating around, an agent suffered much inconvenience when word didn't reach him, he added.

"This is still the least expensive way to disseminate information to the first-line employees," the spokesman said. "Now an agent can— be more specific and knowledgeable on any score—all because of Genie's dream," he concluded.

Bits & Pieces

Microfilm Unit Allows In-House Processing

CHICAGO—The Filemaster III microfilm processor by Bell & Howell allows automatic in-house processing of dye-backed microfilms, according to the firm.

The unit operates in normal room light and gives consistent density and contrast because of automatic control, a spokesman said.

Up to three rolls of 16mm film can be loaded and both normal and thin-based films can be processed intermixed, the spokesman claimed.

Two rolls of 35mm or one roll of 105mm can be accommodated with appropriate load boxes, he noted.

The basic Filemaster III costs $4,195 from the firm at 6800 McCormick Road, Chicago, Ill. 60645.

St. Regis Introduces Dielectric Printing Paper

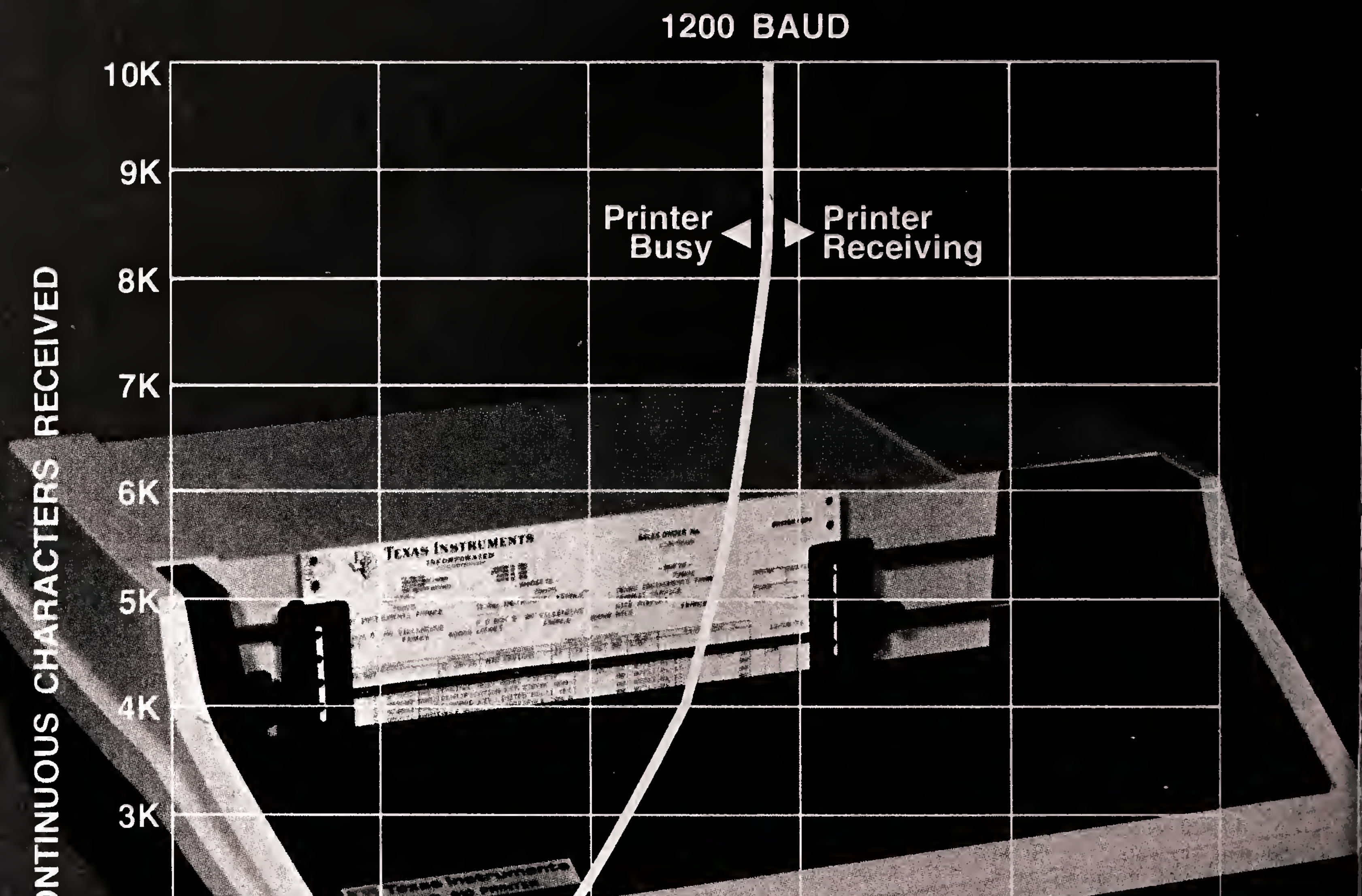
NEW YORK—St. Regis Paper Co. has introduced a high-speed dielectric printing paper with bond-like feel for use with Honeywell's nonimpact page printing system.

The nonglare paper is available in rolls either 8.5- or 11-in. wide by 3,000 linear feet and can be purchased in units ranging from pallet to carload.

Prices begin at $31/roll for pallet-size orders, the firm said from E. 42nd St., New York, N.Y. 10017.

New from TI.

Plot the performance of the Model 810 Printer against any other printer on the market.



With average line lengths of more than 28 characters, the 810 Printer can accept continuous data at 1200 bits/sec with no "printer busy" interruptions for carriage return.

Fiche Option Bows

MOUNTAIN VIEW, Calif. — Quantor Corp. has developed an optional dual-platen fiche carriage for its Q304 microfiche display unit.

The dual platen allows two fiche to be mounted in the viewer at the same time, according to a spokesman. The double-carriage model has all of the features found on the standard Q304, he noted.

The dual platen version of the Q304 costs $200 from the firm at 520 Logue Ave., Mountain View, Calif. 94043.

Micro Enables High-Speed Plotter Output

LAFAYETTE, Calif. — The installation of a microprocessor as the controller in a plotting system is reportedly allowing users to calculate and depict graphical data almost 10 times faster than previously possible.

The microprocessor is an Intel Corp. SBC 80/10 single-board computer that was installed in the plotter controls of a Zeta Research Series 50 plotter system.

Use of an Intel SBC 80/10 has given Zeta the opportunity to develop graphics machine language (GML), which Zeta hopes to adopt as a new universal command structure for the digital graphics industry according to a Zeta spokesman.

Series 50 plotters are used for converting any X-Y data into a graphic representation such as required for business graphics, structural analysis, contour mapping and three dimensional perspective, the spokesman explained.

A host CPU was formerly assigned the task of computing each increment and coding that information for transmission to Zeta's own discrete logic controller. The process, although faster than competitive techniques, was slow and required a large amount of costly CPU time on the host mainframe the spokesman said.

Zeta had a need for versatility that would permit it to change the function of the unit without changing the hardware, he indicated.

The Intel SBC 80/10 was selected for use in the controller primarily because of Intel's leadership stature in the industry. "Intel offered us first source reliability which assured our adaptability to future product lines," the spokesman said.

"Because of the speed and capability of the SBC 80/10, our graphics language became possible," according to Jim Braden, developer of GML.

"With the 80/10, and using GML in the host, we can now drive a plotter up to 4,000 steps per second, look at every vector, accomplish variable acceleration and utilize a 'look-ahead' feature," Braden claimed.

"The Zeta plotter controller is an ideal application for a microcomputer. The need for very compact input, a high volume of computing and high-speed output couldn't be accomplished without it," he said.

Less Expensive

Having the SBC 80/10 do the majority of the computing is simply less expensive than having a maxi computer do it, Braden noted. A typical Zeta user on an IBM 370 host computer can cut down to one-seventh the file size for plot files and one-third the CPU time, he indicated.

An example of this is Zeta's customer, Marathon Oil Co., which uses the Model 50 with a 36-in. plotter in a test program for contour mapping and well logging in oil exploration.

Marathon, an international integrated oil company, requires transmission of plotted data from remote shipboard sites to locations in London, Ohio and Denver for computation and evaluation, according to the spokesman.

Speedy transmission of accurate plots has the potential of saving costly days delay in the decision process and utilizes the at-sea ships more fully, the spokesman said.

Data is run off two mainframe hosts, an IBM 370/168 in Ohio and a Burroughs 6700 in Denver. The Zeta model 50 plotter system should cut transmission of plots to London by a factor of 5 or 6 he said.

Programs running in this test mode also run considerably faster, thus saving CPU time, he added.

OBM OCR System Gets Video Capture Option

MELBOURNE, Fla. — Optical Business Machines, Inc. (OBM) has announced a video capture option for its OCR-ONE optical character recognition (OCR) system.

The option permits the capture of a variety of information not recognizable in terms of the basic definition of OCR equipment, according to the firm.

Applications for the option include signature verification for banking and the generation of mailing labels directly from hand-prepared inquiries.

The offering allows users to capture the video information from a maximum area of 1-in. high by 4-in. wide per output record, the firm said.

Multiple records can be generated for each document, allowing the capture of an entire document, it added.

The option costs $13,000, OBM said from 804 W. New Haven Ave., Melbourne, Fla. 32901.

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TEXAS INSTRUMENTS
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See Texas Instruments products at Computer Caravan and NCC.

Viewers Debut From Realist

MENOMONEE FALLS, Wis. — Realist, Inc. here has a series of portable microfilm viewers.

The four basic viewers — the Educator, Technician, Agent and Executive — utilize rechargeable battery packs and projection modules with specially designed screens to provide for the portability.

The viewers accommodate standard 4- by 6-in. microfiche and other size formats in a variety of magnifications. The units sell for $76 to $129 each from the firm at N93 W16288 Mengal Drive, Menomonee Falls, Wis. 53051.

Monitors Security, Environment

Paris Art Center Puts CPU on Double Duty

PARIS — A CPU-based system monitors security equipment and the environment in the recently opened Georges Pompidou National Centre for Art and Culture here.

The heart of the system is a Control Data Corp. Cyber 18-17. It currently monitors and controls the building's power, air conditioning and security systems.

Later the Cyber will be used to optimize the running of these services on the basis of data collected in the monitoring process.

The first phase has been concerned with automation of security systems. Any attempt at theft or vandalism of a work of art automatically triggers the alarm system as well as automatic cameras that will photograph the event within 1/25 of a second. At the same time, the system orders the closure of all means of exit from the danger zone.

Data is logged at 5,706 points in the building and passed to an Intertechnique Multi 20 computer via data concentrators. The Intertechnique, in turn, signals the CPU whenever it notes a change in state at any data capture point.

According to the function involved, which might be the starting or stopping of a motor or a change in temperature or humidity in one of the exhibition rooms, the mainframe takes appropriate action. If, for example, the building's temperature exceeds predetermined threshold limits, an alarm message will be printed to notify the operator of the condition.

In the event of an alarm, the operator can obtain a diagram of the appropriate section of the installation from a microfiche reader attached to the CPU. This allows him to take corrective action immediately.

All changes in the state of the system are recorded on disk file to create a data base for later statistical analysis. A command console allows operators to investigate the state of the system, set alarms or send commands to specific devices.

The configuration of the Cyber 18-17 includes 32K words of main memory, operator's console, card reader, 4.4M-byte disk unit, two printers, a microfiche reader, CRT unit and plotter.

Scanner/Plotter Handles Big Graphics

CHELMSFORD, Mass. — Flat graphics up to 17- by 22 in. can be scanned and plotted to a resolution of 50 microns in less than seven minutes with a Photomation Mark III System P-1800, according to its vendor, Optronics International, Inc.

For continuous-tone imagery, the LED array operates as a two-channel detector to provide an effective resolution of 200 microns with 128 gray level representation, a spokesman noted.

In the plot mode, film loaded in a removable cassette is exposed at rates up to 240,000 data point/sec. For line art, eight lines of run-length encoded data are plotted simultaneously; for photos, plotting is either 65- or 125 line/in., he said.

The System P-180 interfaces to a Computer Automation, Inc. LSI-2 mainframe or a 9-track magnetic tape system.

Prices begin at $75,000 and delivery is 90 days from the firm at 7 Stuart Road, Chelmsford, Mass. 01824.

Genesis One Introduces Printer For Low-Volume IBM Applications

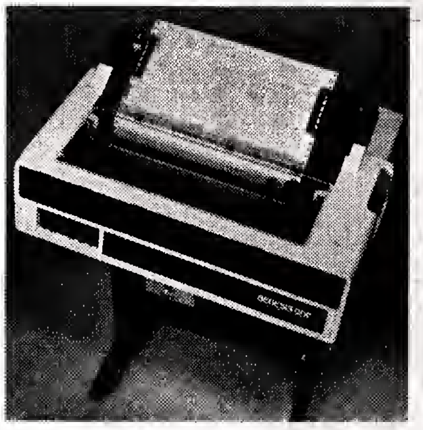
NEW YORK — Genesis One Computer Corp. has developed a printer, the GO60, that it claimed outperforms IBM 3284 printers.

The GO60 can replace or be added on to any printer utilized on IBM 360/370 or 3 systems or any printer using IBM 3271 models 2 and 12 controllers, 3272 or 3791 Model 2 controllers or IBM's local display adapter feature, the vendor said.

The printer is formatted at 132 char./line and 6 char./in. and is programmable to 40-, 64- or 80-variable char./line.

The unit operates at 60 char./sec and is suited for low-volume applications, according to a spokesman.

The GO60 costs $5,000 to purchase or $145/mo on a two-year lease plan plus $35/mo for maintenance, the firm said from 300 East 44th St., New York, N.Y. 10017.



Model GO60

Versatec Adds Off-Line Plotter

SANTA CLARA, Calif. — An off-line plotting system from Versatec reportedly translates vector plot data to raster format for electrostatic plotting on any of the firm's plotters.

Data can be in the form of vector, intermixed vector and raster or simultaneous print/plot information, the firm said.

System components include an intelligent vector processor with an operator panel and display, magnetic tape deck, any of the Versatec plotters or printer/-plotters and Versaplot Pen Plotter Emulation Program software.

Tape deck models are available to handle 9-track, 800 bit/in. or 9-track, 1,600 bit/in. formats. Both models operate at a tape speed of 45 in./sec and a rewind speed of 150 in./sec.

The total off-line system cost is $32,250 from Versatec, 2805 Bowers Ave., Santa Clara, Calif. 95051.

Control System Cuts Reject Rate

(Continued from Page 47)

many computer files with the rejects being handled manually," the spokesman said. "Now that CPCS has provided us with the missing link — rejects — we have a complete and integrated data base that facilitates answering user requests for information.

"Use of the 3890 has increased the productivity of the reader/-sorter operators because its 2,000 document per minute throughput is twice that of our prior equipment," he added. "Also, the operator communicates with CPCS through a CRT terminal and initiates its operation.

"Problems of errors and the proper recovery procedure are indicated on the screen. Recovery and restart procedures for the 3890 under CPCS are very easy."

Any lingering doubt about the ability of the 3890 document processor was laid to rest by a recent incident, the spokesman recalled. A dispatch helicopter was transporting its regular pickup of receipts from the bank's Bremerton branch on the Kitsap Peninsula.

An improperly secured box containing 3,000 checks and deposit slips fell from the helicopter into the water 50 feet off the Bremerton shore. After an unsuccessful effort to retrieve the floating material from the air, a small boat scooped the documents out of the water.

They were taken to the Information Systems Department, where employees worked for hours spreading them on the floor to dry. Luckily, the checks had been tightly bundled and only a portion were badly waterlogged.

"After they had dried, the documents were processed on the 3890 with a reject rate only a little higher than normal," the spokesman recalled.

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Selected on Hardware Alone

Luck Wins Out in Publisher's Minicomputer Choice

By Esther Surden
Of the CW Staff

PETERBOROUGH, N.H.—Many minicomputer users select their equipment based on hardware considerations alone and are devastated when the system's software turns out to be unmanageable.

Luckily, this didn't happen to the publisher of *73 Magazine*, a ham radio publication, and *Kilobaud*, a magazine for microcomputer users.

The company selected its system based on hardware alone, but subsequently found the software available for its mini to be "excellent," according to David Wilensky, programming manager.

Cost a Factor

The company selected its Prime Computer, Inc. 300 after sending requests for information to "most of the major minicomputer manufacturers" including Digital Equipment Corp. and Interdata, Inc., Wilensky said. "Cost was definitely a factor" in the selection, he said, adding Prime's system cost less than the others examined.

The configuration in operation at the two-person shop here includes 64K words of memory, a General Electric Terminet 340 line printer, Terminet system console and eight Lear Siegler, Inc. ADM-1 CRT terminals, chosen because of their screen formatting capabilities, Wilensky said.

Mass storage is on three Pertec Computer Corp. 5440-type disk drives. The system runs under Prime's REV 11 time-sharing system, he indicated.

The system keeps track of subscribers, advertisers, space advertising and reader service, Wilensky said. Bulk subscribers, such as newsstands, are also handled by the minicomputer, which is used for invoicing these customers.

On the reader-service application, the system is used to generate labels to readers who indicate their preferences for certain items on a bingo card located in the back of the magazine.

When the cards are returned, a set of statistical utilities is run to determine such things as what part of the country to place a particular promotion, he said.

The magazines are distributed worldwide with foreign subscriptions making up about 15% of the total, Wilensky indicated.

The space advertising application keeps track of the "financial manipulations," such as discounting, associated with this kind of advertising.

In addition, as a customer service, the firm offers *Kilobaud* readers lists of microcomputer manufacturers and clubs around the country. The Prime system keeps track of this and updates the information.

DBMS Effective

All of the applications programming for the system was done in-house. Besides an exceptional operating system, the Prime has an "effective data base management system" (DBMS) called Keyed Index Direct Access, which Wilensky said is a rarity on minis.

The DBMS system allows the company to have 100,000 subscribers on-line at the same time and to access the files through the CRT "in less than one second," he said.

The Fortran and Assembler for the system are "sophisticated," Wilensky said, adding the firm wrote all its applications in these two languages.

"The system also has a fantastic file handling capability aside from the DBMS," Wilensky noted. The disk-based operating system with virtual memory is "effective and versatile. I came off of a large scale Univac system" and was very wary of software on minis, he added.

Service Very Good

Service for the system has been very good, he indicated. A serviceman is usually at his shop in four hours, "which I think is excellent since Prime is a two-hour drive from here," he stated.

The firm spent about $50,000 for the system hardware, he added.

Minis to Star At Necon '77

NEW HAVEN, Conn. — Necon '77, the first mini/micro conference sponsored by the Data Processing Management Association (DPMA), will be held here on May 19-20.

The conference will feature both an exposition of minicomputer products and speakers on minicomputer issues.

A highlight of the show will be the minicomputer debate between John L. Huges, vice-president of data processing at First National Citibank, who will represent the forces of decentralization, and Robert Weissman, president of National CSS, who will take "a look at the maxi side," according to a spokesman.

Exhibitors will include Applied Data Processing, Inc., IBM, Digital Equipment Corp., General Robotics, Wang Laboratories and others. Turnkey houses and hobbiest shops will also be represented, the spokesman said.

The show and exposition cost $95 for DPMA members and $115 for nonmembers.

Registration information is available from Fred Kells-Murphy, Applied Data Processing, Inc., 33 Bernhard Road, North Haven, Conn. 06473.

HP Unveils Enhanced Version of 3000CX

PALO ALTO — Hewlett-Packard Co. has introduced its 3000 Series I — a version of its older 3000CX processor with a few enhancements for serviceability and an upgraded set of peripherals packaged to appeal to small businesses, according to a spokesman.

Priced at $75,000, the system retains all of the software capabilities of the Series II, the spokesman said.

However, it can only accommodate a fixed amount of memory — 128K bytes in comparison with a maximum storage capacity of 256K available on the Series II.

But, the spokesman noted, the system is in the performance range of the firm's Series II Model 6 — a $110,000 system, HP said.

The system uses HP's 7920 disk system which increases the system's performance from 10% to 50% over the older 3000CX, the spokesman claimed.

Small Business Appeal

The system is in the range of the Digital Equipment Corp. PDP-11/70 and Data General Corp. Eclipse, the spokesman said. It should appeal to businesses that are considering upgrading from batch processing, small colleges, divisions of large companies and systems houses, he added.

The Series I costs about 30% less than the Series II, HP noted.

Series I users can upgrade to the Series II Model 8 for $70,000, the spokesman said. The upgrade requires a CPU replacement as well as a replacement of memory and some circuitry.

Running under HP's Multiprogramming Executive operating system, the Series I supports the firm's Image data base management package. Cobol, RPG, Basic, Fortran and System Programming Language can be accommodated.

The system can control as many as 16 terminals, the spokesman added.

In addition to the use of the 7920 disk drive, the system features the 7920 magnetic tape subsystem, 2640B system console CRT and an enhanced printed circuit CPU backplane.

The system's cabinetry contains 128K bytes of core and a terminal controller.

A basic 3000 Series I with 128K bytes of core, 50M bytes of disk, 1,600 bit/in. magnetic tape drive and 2640 CRT console costs $75,000 including the Multiprogramming Executive and a full set of utilities.

HP can be reached at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Varian Expands Its V77 Family With Large-Capacity Drives

IRVINE, Calif.— Varian Data Machines has added a family of large-capacity disk drives using microprocessor-based controllers to the options available for its V77-400 and V77-600 minicomputers.

The disk drives accommodate from 17M words to 128.9M words. Up to eight of the units can be attached to one controller with a maximum of four controllers per system, according to a spokesman.

A Varian mini can therefore support up to 32 drives for a maximum data capacity of 4.8G 16-bit words unformatted.

The intelligent controller interface transfers data directly between the disk and the Varian multiport memory system at a maximum data rate of 604K 16-bit word/sec.

The data transfers do not require CPU intervention, the spokesman stated.

A dual-access option is available for the disk memory system that allows two V77 systems to access a disk drive. In dual-access operation, each system requires a controller, the spokesman said.

The controller can be obtained in either 120-word sector or 240-word sector models. It provides unmapped direct memory addressing to one million words of main memory, Varian said.

When multiple disks are used, each controller provides for overlap seek, the spokesman noted.

The disk system features data and command chaining which permits read and write functions to be executed over multiple sectors, tracks and cylinders without software intervention, the firm claimed.

Prices for the disk systems range from $13,000 for the 70-7551 with a 17M-word capacity to $32,000 for the 70-7557 with a 128.9M-word capacity.

The controller for the V77-600 costs $9,500 while the controller for the V77-400 system costs $8,000.

Varian is at 2722 Michelson Drive, Irvine, Calif. 92713.

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16-Bit Interdatas Get Floppy System

OCEANPORT, N.J. — Interdata has a floppy disk system for its 16-bit processors. Developed in partnership with Wangco, Inc., the FMD-1 is IBM format-compatible and provides 256K bytes of storage in its basic configuration, the firm said.

The system is available in single- or dual-drive configurations with a power supply, cables and a controller for up to four drives. A second set of single or dual drives with its own power supply enables the system to store 1M bytes.

The unit costs $2,900 for a single 256K floppy drive, power supply, controller and Microbus adapter. A full-blown configuration with four drives costs $7,390 from 2 Crescent Place, Oceanport, N.J. 07757.

Autotrol Has Design, Drafting System

DENVER — The Autotrol Corp. AD/380 is said to perform multidisciplinary design and drafting functions while simultaneously processing engineering batch programs.

A minicomputer-based system, the AD/380 can handle 10 or 12 operators online, each performing a different function while at the same time performing a bill-of-material capture, the firm said.

Multitasking Operating System

The unit's multitasking operating system with foreground graphics processing and background DP capability also supports a file management system with dynamic disk allocation and "full security," the company claimed.

Management software available includes a job accounting program and documentation management system. Engineering programs include survey note processing, finite element analysis, critical clearance, piping, isometrics, automatic wiring list analysis and scientific functions.

Users can also create their own applications packages using Fortran, Cobol, RPG-II or Assembler language, Autotrol said.

A basic system with a 64K Varian V76 processor, 10M bytes of disk, 7- or 9-track tape drive, flatbed plotter, workstation with digitizer, graphics CRT and Comtec interactive CRT that allows alphanumeric and graphic input into the system costs about $175,000, including software.

Interfaces to various mainframes can be optionally obtained, the firm added from 5650 N. Pecos St., Denver, Colo. 80221.

DEC Micro, Instruments Linked

MARLBOROUGH, Mass. — A new interface connecting up to 15 instruments to an LSI-11 microcomputer was announced by Digital Equipment Corp.

Called the IBV11-A, the interface conforms to IEEE standard 488-1975, an industry standard for programmable instrumentation, DEC said. The instrument bus portion of the interface will support a total cable length of 65.6 ft and is hardware-compatible with any system using the LSI-11 as a component.

In addition to communicating with instruments, the IBV11-A can communicate with another identical interface, permitting links between LSI-11s, a spokesman noted.

Single Board

The IBV11-A is contained on a single printed circuit board assembly that plugs directly into any LSI-11 bus-structured system backplane. Devices connected to the instrument bus side of the interface act to control functions, send data to the system or receive commands from it, he said. Operation of the interface is through conventional LSI-11 software protocols.

The IBV11-A costs $750 from DEC's Components Group at 1 Iron Way, Marlborough, Mass. 01752.

Innovex Adds Series Of Diskette Drives

BEDFORD, Mass. — Innovex Corp. has announced its Series 400 diskette drive.

The drive features automatic head unload and stepper motor timeouts, bidirectional write protect, radial stepping ability for overlapping seeks, a host power failure detector, six LED activity indicators and 50-in. ribbon cable or twisted-pair interfacing compatibility, Innovex said.

Recording Capability

The Model 410 is a soft-sectored, IBM-compatible drive while the Model 420 is hard-sectored. Both provide single- and double-density recording capability, the firm said.

A proprietary data separator design coupled with a digital noise filter and a way of handling recorded signals results in 35% greater data integrity margins than those available from other makers, the firm claimed.

The Model 410 costs $575 while the 420 is $585. Quantity discounts are available, Innovex said from 75 Wiggins Ave., Bedford, Mass. 01730.

ECS Unit Monitors Energy Consumption

ATLANTA — A desktop minicomputer-based system designed to help medium-sized companies reduce energy consumption is available from Energy Control Systems (ECS) here.

The system is based on a Hewlett-Packard Co. 9815 desktop system. It controls the air movement units so they can be turned off for five to 10 minutes at a time without upsetting the climate within the facility when outside conditions are normal, the firm said.

A Peak Power

The system also helps recognize approaching peak power consumption times and reduce nonessential power loads when the peak is being reached, ECS added.

An audit at the end of each month supplies information to determine if billing by utility companies has been correct, the company noted.

The ECS system costs $8,000 including the HP 9815, software, status display/override panel and associated electronics, ECS said from Suite J, The Arches, 6901 Peachtree Industrial Blvd., Atlanta, Ga. 30092.

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'Prefire Planning' Program

Mini-Based Training System Instructs Fire Fighters

ROCKFORD, Ill. — A minicomputer-based system in combination with video tape is teaching fire fighters "prefire planning," at fire stations here.

Funded by the National Science Foundation, the TV teaching system was designed by television and computer experts from Michigan State University, (MSU) working with Broadband Technologies, Inc. and engineers at Rockford Cablevision.

The Rockford fire stations receive the video instruction through their regular cable TV hookups to Rockford Cablevision.

The system provides videotaped instruction to fire fighters on the highly technical task of "prefire planning" and also plays a few "hands" of blackjack with fire fighters after the lesson, according to Dr. Thomas Baldwin, professor of telecommunications at MSU.

Prefire planning involves a complete survey of major buildings so that in the event of fire, the fire fighters will know where the occupants are located, understand the floor plan and recognize potential hazards inside and outside the building.

Question-Answer Format

Fire fighters participating in the experimental program view videotaped lessons and respond to multiple-choice questions which appear on the screen about every two minutes.

They record their answers by pressing the appropriate button on a small console or response terminal which transmits the choice to the "head end" — the control point for the TV training system as well as the regular Rockford Cablevision operation, Baldwin explained.

Heart of System

The heart of the system is a General Automation, Inc. SPC-16 minicomputer which controls all components of the training system, including the videotape, the feedback by character generator and the line printer which creates several printed reports during and after each lesson.

The mini in the two-way system takes attendance as the fire fighters "log in" by punching their own code letters into the response terminal, Baldwin said.

When the fire fighters respond to questions, the system scans for responses, waits for all who have logged in and then displays on the TV screen the answers telling each participant whether or not the answer was correct.

Following a short quiz at the end of each lesson, the system displays a percentage score for each participant, first for the quiz and then for the lesson as a whole.

Four versions of each training program are presented to different groups of fire fighters so that the value of the two-way system can be tested.

"Program administration for the centralized TV training should be easier than with conventional training," he pointed out. There will be a printed record of each learner's attendance which simplifies scheduling make-ups for the fire fighters who are often called to a fire in the middle of a lesson.

Interface Card Links HP Printer With Minis

PALO ALTO, Calif. — An I/O interface card that allows users to use the Hewlett-Packard HP 9881A wide-carriage impact printer subsystem with both the HP 9825A and 9831A desktop minicomputers is available from HP.

The HP 9881A prints 200 line/min regardless of line length and has a full 132-column width, the firm said. An 8-channel vertical format unit simplifies automatic form fitting and vertical formatting under program control, the company noted, adding an Ascii 64-character set is standard.

The 9881A costs $7,990. An option including the interface card cables and operating notes costs $625 while the interface card alone costs $225, HP said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

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Consultant Views Distributed Processing as Cyclical

By Don Leavitt
Of the CW Staff

CLEVELAND — Many things move in cycles and the application of distributed processing techniques probably follows that pattern, according to J. David Ehlke, vice-president of Neoterics, Inc., a consulting firm here.

The late 1950s and early '60s was a period of decentralized DP marked by the use of unit record equipment and single-function computers. The pattern changed, however, starting about 1965 as larger mainframes, especially the IBM 360, came onto the scene.

Once the operating systems were built, that class of machine could handle multiple functions concurrently. And it had enough main memory and on-line storage so the possibility of a central data base could be considered realistically, Ehlke said here recently.

The year 1975 marked the start of interest in decentralized, distributed processing, he said. And this coincided with the broadening availability of minicomputers and small business systems in the commercial marketplace.

Three Forces

The trend to distributed processing has its roots in three separate developments, according to Ehlke. The DP evolution of the early '70s provided much of the technology now in use. It also fostered many of the concerns for service coupled with security and privacy that are hallmarks of distributed systems.

The multiplicity of minicomputers and the growth in their power and capacities along with modern business management trends are also part of the explanation of how we got to where we are today, he said.

The DP evolution was distinguished by the development of large multiprogramming operating systems, high interest in telecommunications, time-sharing and massive, integrated data bases. Users began to see the possibilities of on-line inquiry systems with almost instantaneous lookup of data.

As the systems developed more power—measured in speed, memory, disk capabilities or the spectrum of other peripherals—users began to expect more and more service and to encounter more and more cost if that service was to be provided.

All of that inevitably led to a desire on the part of the users to have access to the data and finally to the equipment itself, Ehlke continued.

Change on Mini Scene

Meanwhile, the minicomputer scene was also changing, even more rapidly than the mainframe scene. Government funding declined for research projects, which had fostered development of many minis. At about the same time, peripherals makers saw a market for their products linked to the small, increasingly sophisticated computers.

These units were gaining better operating systems, software packages were becoming available (and acceptable) and users realized that minis offered the potential for interactive processing that seemed to be out of the question on the big, centralized CPUs.

Within business management, too, there were changes occurring in the early '70s, Ehlke noted. There was more delegation of responsibility and authority and a trend toward multiple plants or distribution centers strategically located.

Younger members of the management teams were educated, or at least exposed to computers. And consumerism, with its concern for value, was matched by management's growing concern about office and administrative productivity.

All of this means a rush toward distributed processing is now beginning. With that movement, there will be many mistakes and many disasters, but many opportunities as well, he said. Unfortunately, the consultant added, there will also be many overambitious expectations.

Overall, however, distributed processing will have many positive effects, Ehlke said. Management will make better, more informed decisions and there will be generally improved accessibility to information by those who need it and use it.

There will also be a reduction of clerical tasks and an attendant slowdown in the inflationary labor cost for office administration. For their part, managers will be relieved of much paper shuffling and will have more time to think and analyze situations in terms of current rather than historical data.

PDP-11 Link Offered For Analogic System

WAKEFIELD, Mass.—Analogic Corp. has a Digital Equipment Corp. PDP-11 direct memory access (DMA) interface for its AN5400 data acquisition and distribution system.

The interface is said to be compatible with all of the PDP-11's timing and control signals. The plug-in board provides for both program I/O and DMA control and was designed for table-driven DMA capability with hardware table chaining, Analogic said.

Analogic also provides a PDP-11 driver and exerciser. The driver is a built-in software program module which reportedly can be used with any DEC operating system and is linked with user programs to perform AN5400 functions.

The exerciser runs under RT-11 and allows users to carry out various tasks by typing in two-letter commands, the firm explained.

The PDP-11 interface costs $2,300 from the firm on Audubon Road, Wakefield, Mass. 01880.

GC/MS System From HP Identifies Mass Spectra

PALO ALTO, Calif.—Hewlett-Packard Co. is offering a minicomputer-based gas chromatograph/mass spectrometer (GC/MS) system which is said to allow quantitative analysis and positive identification of mass spectra.

The HP 598A has a dual chemical/electron ionization source, automatic tuning, an HP 21MX E series minicomputer, hyperbolic quadrupole mass filter, a microprocessor-controlled gas chromatograph and all-digital electronics.

The dual-disk system offers real-time data acquisition and data reduction operations.

The GC/MS system is priced at $121,000 from HP at 1501 Page Hill Road, Palo Alto, Calif. 94304.

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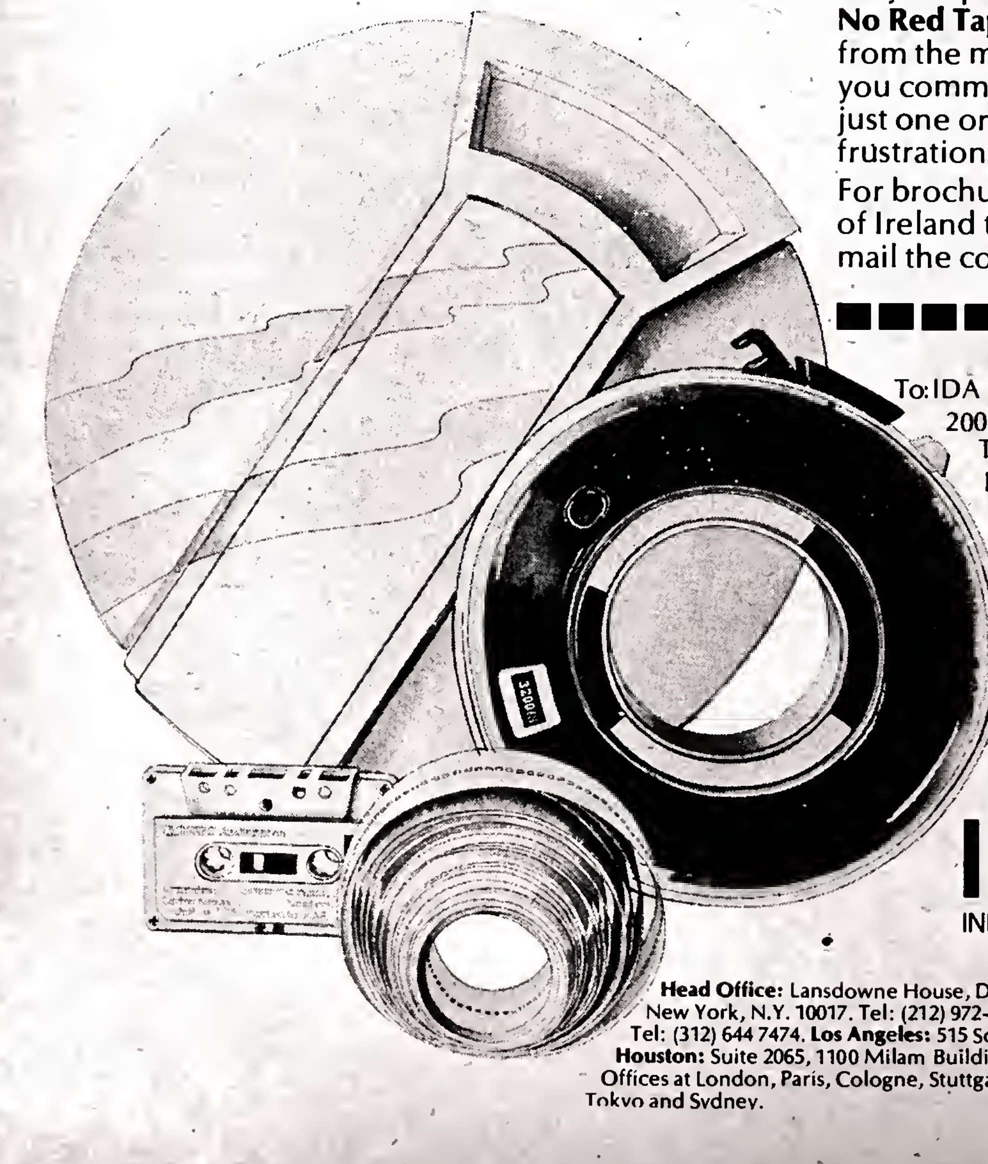

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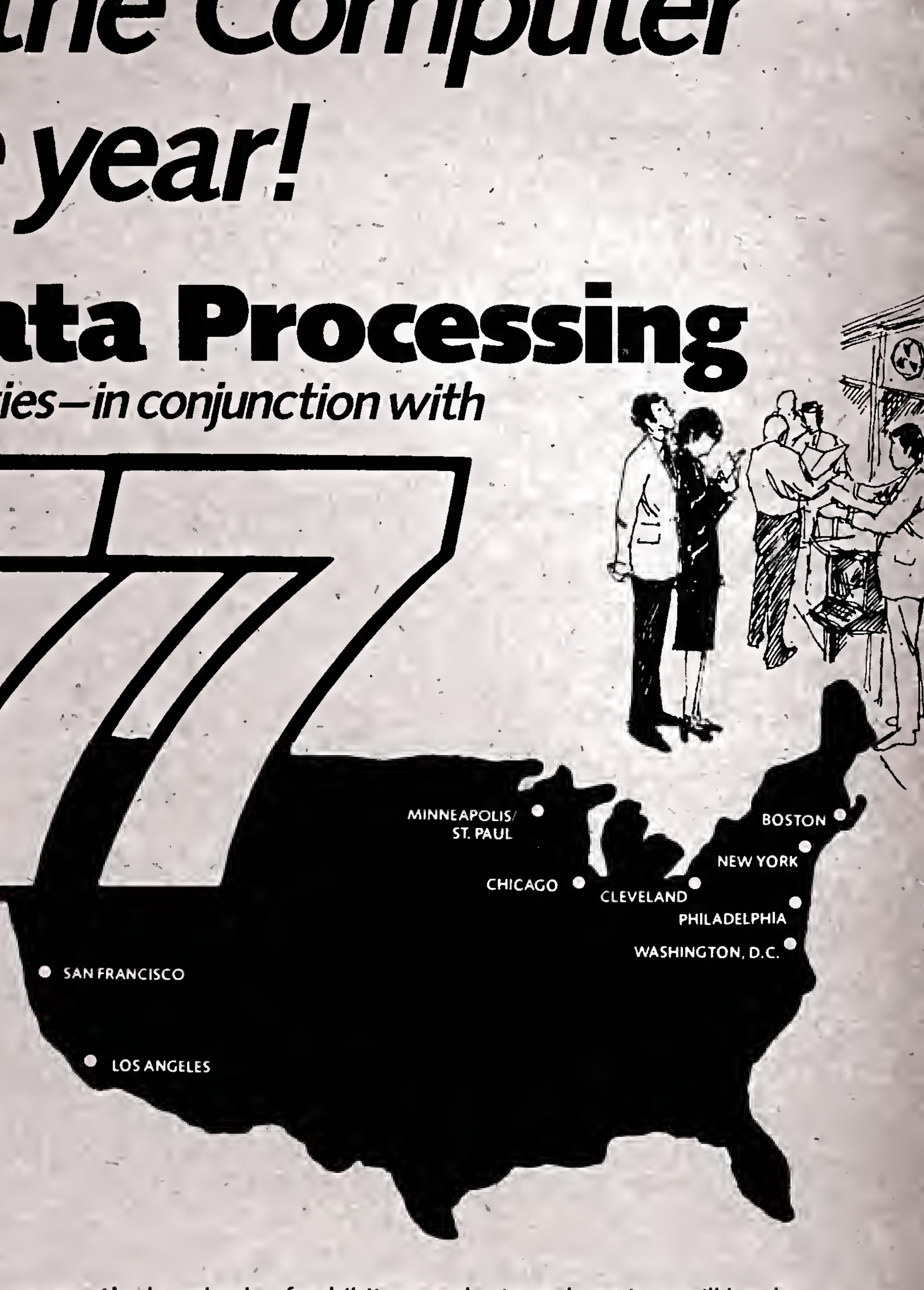

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Firm's GRI 99 Picks Up Where Its IBM 3 Leaves Off

CHICAGO — Two small business systems operating side by side in the corporate offices of Consolidated Packaging here are helping this firm perform both batch and on-line applications more efficiently, according to Warren Beller, information systems manager.

"The two machines are complementary, even though they are different manufacturer's products," he noted.

Beller is responsible for the operation of an IBM 3 and a GRI Computer Corp. System 99 at corporate headquarters as well as a System 99 at a remote location.

The IBM 3/15 has 160K of memory, four IBM 3340 disk drives, three 3410 tape units and a 1403 1,100 line/min printer; it supports bisynchronous communications with nine of the firm's 11 plants.

The GRI System 99 at the Chicago location has 64K of memory with 10.6M bytes of disk storage on IBM 5440-type, double-density disk cartridges; a tape drive; a 165 char./sec Centronics Data Computer Corp. printer; and three CRTs.

The interactive capability of GRI's RPG-II and a text editor available from GRI are the basic differences between the IBM 3 and the GRI 99. "Real-time applications and on-line updating of program source files are features that just were not available on our IBM 3," Beller noted.

The firm is also seeking to replace the intelligent terminals it has at its branches with the GRI minicomputers.

"Back in 1972, we had IBM 3735 intelligent terminals at our 11 remote locations," Beller recalled. "But we found that we were pounding the 3735 typewriters to death, power typing for seven hours every day. That's when we began replacing the 3735s with Mohawk Data Sciences Corp. 2300s three years ago."

However, Consolidated wanted to put on some other applications at that time and had exhausted the capability of these terminals, which supported only one data entry station. To stay with the intelligent terminals, the only alternative was to place additional Mohawk 2300s at each remote location.

Beller shopped around a while and came up with GRI's System 99. Most of the RPG-II programs running on the IBM 3 also ran on the GRI unit.

Most important, Beller said, GRI's interactive version of RPG-II gives the program (or programmer) immediate access to what is being entered at the terminal and a true interactive conversation can be carried on.

"Even though the IBM 3 has communications and can converse with terminals, it is still in a batch fashion. A whole line of data or, worse yet, a whole block of data is released to the program at once, and by the time the program indicates an error to the terminal operator, the whole line might have to be reentered," Beller said.

In GRI's interactive, conversational mode, the advantage is being able to control what's going on at the screen from the program, he said. The program has full edit capabilities as the data is being entered and can request immediate correction.

There are at least a dozen improvements on GRI's RPG-II that Beller would like to have available on his IBM 3. "That's why I say the two machines are complementary," he explained. "The System 99 picks up where the IBM 3 left off."

Consolidated finds it more convenient to run batch applications on the IBM 3 because he said, they run faster. At the remote locations, the 2300s are being replaced with the GRI systems.

"We already have a System 99 installation at Monroe, Mich., as well as the one here in Chicago. They communicate with each other, and the data needed by the IBM 3 is transferred via 800 bit/in. magnetic tapes," he added.

"At this time the System 99s are used to input payroll, accounts payable, inventory and general ledger data from the users' areas. We also keep our IBM 3 source program library on the corporate System 99 since it is easier to make changes and modifications to the programs using the GRI source text editor," he said.

Service for the system is through Sorbus, Beller noted, and it has been "excellent." Software support from the vendor has also been very good, he indicated, terming GRI "responsive" because of its small size.

Distributed Micros Cut Budgets For Building's Energy, Security

Special to Computerworld

DENTON, Texas — A distributed microprocessor energy management and security system has reduced electrical demand by 38% and consumption by 49% while reducing annual security and maintenance personnel costs by approximately $24,000 at the Denton Federal Center here.

The system monitors the building's temperature, controls equipment and prevents intrusion by unauthorized personnel. It also communicates with an Interdata 7/16-based environmental control system located in the Dallas Federal Building, 40 miles away.

Both systems were developed by Radix II Inc. a systems developer in Oxon Hill, Md. The Denton system uses five National Semiconductor Corp. SC/MP microprocessor application cards organized in a distributed network to provide functional decentralization.

"The system was conceived primarily for personnel safety and building security," according to Robert Kuykendall, assistant building manager. "The facility has three underground levels with six controlled-access doors. Since sump pumps and other equipment had to be monitored to prevent flooding, we decided to include heating, ventilation and air conditioning control as well as fire and smoke detection."

Prior to the installation of this system, the facility was occupied 24 hours per day, 365 days per year. Reductions in the agency requirements resulted in reducing the occupancy hours to 8 a.m. to 5 p.m. Monday through Friday; however, this did not eliminate the operation and security requirements during the nonoccupied hours.

"For a comparable three-month period, the average electrical demand was down from 281 to 173 kilowatts per month and the average electrical consumption was reduced from 165,440 to 83,361 kilowatt hours per month," Kuykendall said.

"This amounts to a savings of $3,472 a month," he said, "which isn't bad when you consider that the price of the Radix II system is $16,000 with an additional $5,200 in materials and federal personnel time for wiring installation. The system will pay for itself in a little over six months."

Functional Distribution

The five micros are distributed according to a specific processor priority of tasks. One battery backed-up SC/MP performs all supervisory functions for the system and exercises overall control strategies.

Two other SC/MPs provide security, sense building temperatures, operate building equipment and monitor both electrical demand and electrical consumption. A fourth SC/MP controls a local 40-column status printer while the last serves as a telephone line communications controller to link the system with Dallas.

The system distributes both the intelligence and the memory capability to address jobs normally associated with minicomputer systems. All processors are interconnected, providing various levels of system redundancy.

Each processor has 4K words of programmable read-only memory and 2K words of random-access memory. Only the supervisory processor has standby battery support.

Conference on Buying Set

CHESTNUT HILL, Mass. — Boston College will sponsor a seminar on buying and using a small business computer here May 14 from 9 a.m. to 4:30 p.m.

The seminar will cover small systems applications, requirements in selecting a system, implementation alternatives, requests for proposals and ongoing operational requirements. It is designed for business owners and managers who want a method to purchase a small system.

The seminar costs $125. Information is available from the Boston College Management Institute, Fulton 405A, Chestnut Hill, Mass. 02167.

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CI Notes

French PTT Issues RFP For Electronic Mail Units

CAMBRIDGE, Mass. — The French Post, Telephone and Telegraph (PTT) has issued a request for proposals (RFP) for 1.1 million electronic mail/facsimile terminals that will form the basis of a nationwide electronic mail system, according to the Yankee Group here.

The units should be able to communicate an 8.5- by 11-in. page in two minutes and be fully digital, with automatic answering, call party identification and automatic paper feed at reception.

The units should also be noiseless, odorless, reliable and as small as possible.

Copies of the RFP can be obtained from the Yankee Group, P.O. Box 43, Cambridge, Mass. 02138.

Semi Group Formed

LOS ALTOS, Calif. — The Semiconductor Industry Association has been formed to focus initially on the gathering of reliable industry statistics and on critical government relations at both state and federal levels.

Members of the association include Advanced Micro Devices, Inc.; Fairchild Camera and Instrument Corp.; Intel Corp.; Motorola, Inc.; and National Semiconductor Corp.

Nixdorf to Buy Entrex

BURLINGTON, Mass. — Nixdorf Computer AG of West Germany has agreed to acquire Entrex, Inc. here as a wholly owned subsidiary.

Nixdorf has marketed Entrex products in western Europe since 1973 and at year-end 1974 began manufacturing key-to-disk systems in West Germany under a license agreement with Entrex.

Following its acquisition, Entrex will continue to operate under its present corporate and product names and will also continue to maintain its other international business relationships.

Under terms of the agreement, Entrex shareholders will receive cash for their shares.

Supershorts

Okidata Corp. is offering maintenance service to users of its CP110 printers in major U.S. cities.

Cobol on Minis — Part 2

Software Houses See Market Potential

By Molly Upton
Of the CW Staff

The current industry trend toward offering Cobol on minicomputers has created a growing market for software vendors. Several companies are taking advantage of the new opportunity.

Two firms that offer Cobol for Data General Corp. Novas backed into developing Cobol compilers for the DG line rather than on any other mini. In neither case was a search done of suitable mini architectures.

Both IST Datasystems of Memphis, Tenn., and International Processing, Inc. (IPI) of Orlando, Fla., built on their prior experiences with the Nova line when they developed Cobol compilers.

But if Cobol suitable for business applications has been created for the Digital Equipment Corp. PDP-8 or PDP-11s smaller than the 34, the developers are keeping it quiet.

One firm, Educomp, has evolved Cobol for the PDP-8, but admits it is not of sufficient power to cope with many functions needed in business applications.

Some software companies design their own operating system while others use the manufacturer's.

IPI's Cobol runs in conjunction with its own operating system in a package called Blis/Cobol. The IST version of Cobol is handled by the standard DG operating system, and Educomp's Cobol runs under either the standard DEC operating system or Educomp's version.

IPI sells primarily to systems houses and does not itself provide any hardware or applications software, preferring not to infringe on its customers' territories, according to Albin D. Dolney, marketing manager.

Part 1 of this series looked at offerings from manufacturers of small machines that run Cobol in under 60K. Part 2 shows there is a growing market for software vendors in this area.

IPI initially conceived the idea of creating an operating system for Novas after it decided the DG RDOS operating system was not sufficiently powerful to provide the "multiuser type of virtual memory that we wanted," he said. "We felt the market was going to distributive processing on a multiuser basis, so we wrote our own."

Having done contract software work with savings and loan institutions, IPI found each instance required a "reinvention of the wheel" because — although the desired results were similar — there was no common language in use.

Most required linking to a larger machine

(Continued on Page 60)

Adapso's RPSS Focusing Energy On FCC and Legislative Issues

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — Change is coming to the communications arena from a number of directions and the Remote Processing Services Sector (RPSS) of the Association of Data Processing Service Organizations (Adapso) has been reorganized to better cover legislation, the Federal Communications Commission (FCC) and international happenings, according to panelists at the recent Adapso Management Conference here.

"There is a danger in feeling that the Bell Bill is dead, as that may make passage easier," Bob Weissman, president of National CSS, warned attendees of the communications session.

The Bell Bill —officially known as the Consumer Communications Reform Act — is "an insidious kind of thing since it has been introduced in a variety of permutations," according to Weissman, who heads the RPSS' legislation segment.

Herb Marks, counsel for the RPSS, noted there are about 40 bills in Congress that are variations of the Bell Bill, about half of which contain all the points of the Bell Bill refiled this year.

About 30% contain the same provisions of the Bell Bill except the one that would grant AT&T freedom to make acquisitions without attack on antitrust grounds, he said.

Chuck Jackson, staff engineer for the House Subcommittee on Communications, said the problem with the Bell Bill is that it is the only comprehensive alternative to the status quo.

If Congress were pressed for a quick decision in this area, the Bell Bill is the only one to which to turn, he said.

(Continued on Page 60)

IBM Announcements to Foster Total Industry Growth: Broker

By Toni Wiseman
Of the CW Staff

NEW YORK — IBM's recent rash of announcements "will eventually aid the growth of all traditional DP companies by enhancing demand for advanced applications," according to L.F. Rothschild & Co. (LFR), a brokerage firm here.

Those IBM announcements included the 3033 processor, a 30% reduction on larger configuration 370/158 and 168 purchase prices, a 35% reduction in rental/lease/-purchase prices on selected 370 main memories and the Systems Extension program.

The introduction of the 3033 was long overdue, judging from the success of plug-compatible units from Amdahl and Itel that offered users better price/performance while maintaining their traditional tie to IBM software, LFR said.

This series of moves, in terms of new equipment, software and pricing, fulfills the prophecy LFR had issued in an earlier analysis [CW, March 21] regarding the giant's strategy vis-a-vis plug-compatible manufacturers (PCM).

The Systems Extension program, for instance, means PCMs will face the added tasks of equipping their machines to interface with the new IBM software, LFR noted.

Meanwhile, "the purchase price reductions on the existing 158/168, coupled with expected new products in this area as well as the 3033, should provide a serious deterent to Itel's marketing [of]

(Continued on Page 59)

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Choice of Custom Software Firms Seen Dwindling as Business Market Matures

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — By 1980, there will be fewer custom software firms, according to Chuck Schneider, vice-president, operations of Informatics, Inc.

As the market matures, there are an increasing number of mergers and acquisitions and few new firms are being started he said, indicating the shakeout will probably come in 1979-1980.

Firms will become more marketing-oriented and the profit margins will rise, Schneider told attendees at a recent Association of Data Processing Service Organizations conference here.

In addition, the commercial market, which he described as "virgin territory," will grow faster than will the government market.

Specialization will be the key to success, and users will continue their migration toward seeking total solutions, he said.

Revenues to Grow

Revenues in the custom software industry are projected to grow 12% per annually from $670 million in 1976 to $870 million by 1980, Schneider said.

Revenues can grow rapidly if the company is in the right market segment and willing to forego some profits, he indicated. The investment is low, he noted, reiterating the importance of accounts receivable collection.

Also, business is relatively recession-proof since it has long-term contracts and backlog carryover.

In recessions, for instance, firms may stop buying packages, but they still need to maintain what they have and are more apt to spend their money on custom services, he explained.

In addition, work in new areas may lead to products and services for the firm, he suggested.

Among the bad news is the high turnover of employees, Schneider said.

Fixed-price contracts should be avoided, he warned, especially with unsophisticated users who often don't have the discipline and foresight to draft a complete contract that won't need changing.

There is a need for some very creative bidding, he added. "You've got to be first or you're a loser."

Keys to Profitability

Thiel Sullivan, president of Information Sciences Co., gave attendees a list of keys to software profitability. These are applicable to doing business in the commercial world as well as the government, other speakers noted.

The list includes long-range planning, programmatic marketing, technological currency, contracts mix and strong project management.

Other factors are software engineering, effective control systems and competitive pricing.

'Quasi Put Down'

The term "custom software" was probably created by people in the packages business as a "quasi put down" since there is no such homogeneous category, according to Larry Schoenberg, president of AGS Computers, Inc.

The field is incredibly diverse and, even when narrowed to define a direct competitor, one rarely sees that particular company, Schoenberg said.

"It's a competitive business, yet it's not."

If there are more than three firms bidding on a job, AGS doesn't normally bid, he said.

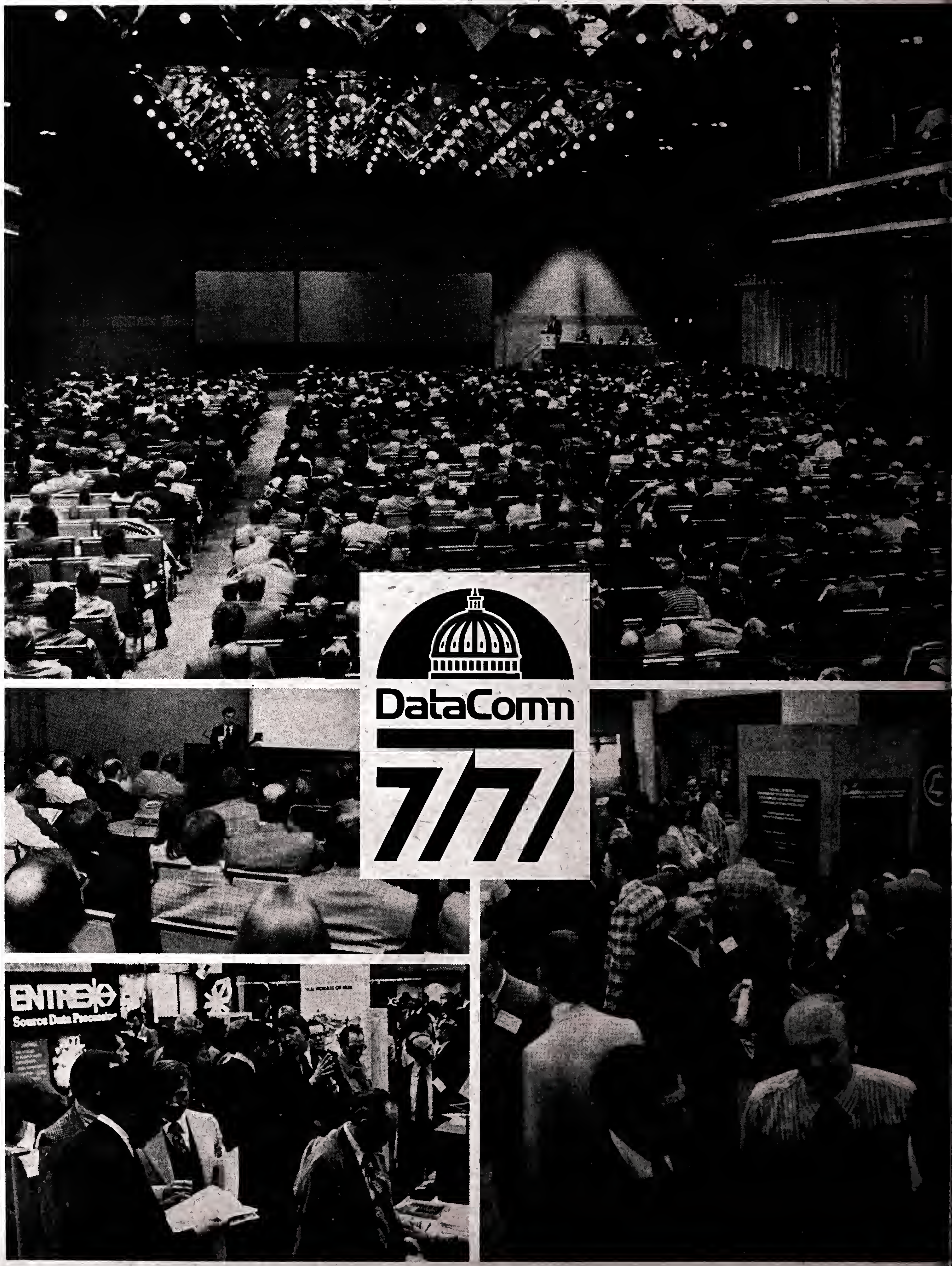
Profitability: A Game?

WASHINGTON, D.C. — Profitability of custom software firms to a large extent depends on how well one plays the accounts receivable game, according to speakers at a session on custom software at a recent Association of Data Processing Service Organizations conference, here.

After starting a business, most of the investment is in accounts receivable according to Chuck Schneider, vice-president of operations at Informatics, Inc.

If accounts receivable equal two months of revenues and earnings account for 7%, the return on revenue is 42%, Schneider said. However, the return changes to 21% if the accounts receivable equals four months of revenues, he indicated.

By comparing notes, the speakers concluded the level of profit from government contracts is generally lower than that in the commercial sector.



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Amdahl Additions Show Interest in Broadening Market

By Toni Wiseman
Of the CW Staff

SUNNYVALE, Calif. — Close on the heels of IBM's announcement of the 3033, Amdahl Corp. announced two large-scale systems, one larger and one smaller than the 470V/6. The company also reduced the price of the 470V/6 [CW, April 18].

"These new systems broaden the company's market and provide it with an opportunity to expand unit shipments," Amdahl president Eugene R. White said in an interview here recently.

"I believe the effect of the price reduction on the 470V/6 and the comparable favorable prices for the new systems will be offset by cost decreases, production efficiencies and increased unit volumes," he said.

Amdahl is very interested in broadening its market, but only in large systems, he noted. The new systems are based on the proven technology of the 470V/6, he said, with the smaller 470V/5 utilizing all of the design abilities of the V/6 product line, with similar design constraints. The larger 470V/7 was designed to take advantage of more advanced technology than what the firm has been using in the V/6.

The mainframe business remains good, White said, pointing to the fact that last January Amdahl had 33 systems installed and expected to install eight to 10 more in the first quarter.

Surprisingly, one factor which has contributed to the success of large mainframe vendors is the current trend toward distributed data processing, White said.

"We've been experiencing an explosion of distributed computer processing among our customers and potential customers. And, in fact, what has proven to be true is that as the customer goes to dedicated systems, it encourages new applications — which means new data bases and more demand for telecommunications.

"This all manifests itself in more demand on the central processor and the need for a large system," he said.

White said he would not be surprised if, based on Amdahl's results in the last year, others did not consider entering the large systems market, much as National Semiconductor and Itel did.

The size of the potential marketplace is a positive factor, he said, but "the leadtime works against manufacturers. The development time for large-scale systems is much longer and more expensive than for small systems.

"If a manufacturer didn't make the decision three years ago, he isn't going to have a system before the 1980s," he added.

IBM Moves Seen Fostering Growth Of Total Industry

(Continued from Page 57)

370/158-compatible CPUs produced by National Semiconductor.

"In general, we view IBM's aggressive announcements as a logical response to current marketplace needs and as a well-planned reaction to the newest form of plug-compatible competition," the brokerage firm stated.

LFR predicted price elasticity will create demand for new applications and increase the demand for DP equipment in general. In addition, all DP manufacturers are achieving higher profit margins on their new systems as a result of manufacturing efficiencies.

"Though IBM's price actions will preclude these companies from realizing a large profit margin expansion on memory products, the increased demand for data processing power could materially increase total profits for all participants," LFR said.

In its "Morning Meeting Commentary" newsletter, LFR summarized its views of the impact IBM's announcements will have on selected mainframers.

The impact on Burroughs should be fairly neutral since its exposure in the larger computer business is limited, primarily because of the diverse characteristics of IBM's and Burroughs' equipment and customer bases, LFR said.

Univac should continue to enjoy the price elasticity it has had in the past because of its wide, diverse customer base. "Large-scale computers are very important to Univac's growth, and recent planned introductions are expected to be well-received by Univac's existing customer base."

"Honeywell could possibly feel the effect, since it is still attempting to complete its customer base's transition to a new line. However, prior experience indicates that the company can be a successful product/price competitor," LFR pointed out.

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Thanks, too, to the companies who exhibited at DataComm 77, and for the opportunity you provided attendees to learn about the latest developments in datacomm products and services.

And a special vote of thanks to those who served as chairmen or panel members, and to the speakers, who devoted so much time and effort to making each session well worth attending. These professionals from government, business and industry, the field of education, and consulting organizations did much to sustain the high quality of DataComm throughout the three-day program—

DataComm Organizing Group

from the Keynote address by Congressman Lionel Van Deerlin (D-Calif.), Chairman of the House Subcommittee on Communications, to the last of over 50 sessions and workshops. Many of the speakers were called upon to repeat their sessions to accommodate the large number of interested attendees.

Total Industry Involvement

Datacomm users from both the governmental and private sectors, datacomm marketers, officials from Federal regulatory bodies (including FCC Commissioners), Administration spokesmen and Congressional representatives concerned with telecommunications—DataComm 77 drew participants from all segments of the datacomm community.

The Conference was particularly successful in achieving a major objective: bringing government officials and users together for the first time in large numbers for productive dialogue. Datacomm industry leaders and government representatives shared the podium in sessions featuring lively interchanges with users on such controversial issues as the CCRA legislation, the FCC's new Computer Inquiry, EFTS, security and privacy—all matters of crucial importance to data communications interests.

These Issues sessions were an important addition to the annual DataComm program which regularly includes datacomm basics, product workshops, industry applications and networking.

A Look Ahead

This successful effort at opening the lines of communication between legislative and regulatory bodies and users and vendors will be expanded even further in next year's DataComm program. For this reason, Washington, D.C. has already been selected as the site for DataComm 78 next February 21-23, and plans are well underway to make the 1978 program even more stimulating and informative for next year's participants.

Thanks again to all who helped make DataComm 77 such a resounding success. We'll be looking forward to meeting with you again next year in Washington—where the action is!

DataComm 78

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Facing Page: DataComm 77 attendees (top photo) hear Keynote address by Congressman Lionel Van Deerlin (D-Calif.), Chairman of the House Subcommittee on Communications. Bottom photos show attendees participating in conference session and viewing exhibits.

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Intersil Consolidating Add-Ons

By Molly Upton
Of the CW Staff

CUPERTINO, Calif. — Intersil, Inc. is consolidating its IBM 370-compatible add-on memories into two basic units with modifiable interfaces, according to Dick Andreini, vice-president of system marketing.

With the incorporation of Intersil's own 8K memory devices, the larger unit's prices represent a 10% to 15% price reduction over the firm's previous memories with 4K chips, he said.

The Universal Memory System (UMS-1) was designed to accommodate the 370/158 and 168 as well as the recently announced 3033 and future products, Andreini said.

It contains 8K MOS dynamic random-access memory (RAM) with capacity ranging from 512K to 8M bytes on the 158 and 1M byte to 16M bytes on the 168. The high capacities are twice the size IBM provides for these machines, he said.

Volume production is expected to start in May and the firm expects to deliver over 100 units within the next six to eight months, Andreini indicated. Intersil has already shipped four units ranging from 2M bytes to 5.5M bytes, he said.

Although he would not quote prices, Andreini said the end-user prices should be in the $65,000 to $75,000 range for the first megabyte on the UMS-1. Intersil does not market to the end user, but rather to firms such as Itel that provide IBM systems and/or plug-compatible units.

The 8K devices have access times of 120 nsec to 150 nsec, he said. Intersil is the "only firm I know of offering 8K devices on these types of systems," he added.

The UMS-2 was designed for the 135, 145, 138 and 148 and fits on all models of the 135 and 145, he said.

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Software Firms See Cobol's Potential

(Continued from Page 57)

that ran under Cobol, he said, so IPI built cross-compilers and all types of communications vehicles.

IPI's first version of Cobol "wasn't much. It was a very minor Cobol compiler, but it proved to the world that Cobol could exist on a mini," Dolney said.

The firm is in its fifth major revision now, he added. Blis will support up to 30 terminals on a 32K-word Nova, with each user having his own program.

IPI's relationship with DG is totally independent, he said. Frequently a DG salesman will call in IPI at the "eleventh hour" when his prospective customer doesn't want to pay the price tag for the Eclipse, the only system for which DG provides Cobol, Dolney said.

Although the salesman knows the Blis system will accommodate a variety of non-DG peripherals, he weighs the possibility of one sale vs. no sale and usually calls in IPI to tell the user about its software, he explained.

About 90% of the time "we'll retrieve the sale for the DG salesman," he added.

IPI's Blis is on about 200 systems in the U.S. and the average cost is $3,000. The operating system and the Cobol compiler and a complete package of utilities are supplied on a disk.

The Cobol is Ansi 1974, but does not contain all the features, such as those not normally needed by the business community, Dolney said.

For those users switching from another manufacturer's Cobol, Blis provides a syntax scanner which will point out what needs to be altered in order to run under Blis, he noted.

IPI provides Blis to about 35 systems houses in the U.S. and about 14 overseas. For support it offers a "hot line." Ninety percent of the calls are about writing Cobol. he said, rather than about the system itself.

IPI is at 6237 Edgewater Drive, Orlando, Fla. 32810.

Packages Plus Compiler

IST Datasystems offers a Cobol compiler as well as applications written in Cobol for the "entire Data General line," although there have been no user installations on the DG microprocessor yet, according to Fritz Maehling of the firm's systems department.

The Cobol will run under any standard DG operating system, including the new AOS, he said. IST's Cobol is based on the 1968 version with a "couple of minor variations" and the firm is converting this to make it compatible with the 1974 Ansi standard, he said.

About 80% of the Cobol customers are end users and the other 20% systems houses, he said.

IST evolved into offering Cobol for DG minis as an outgrowth of its experience through its parent company's work on the Bias system for radio and TV stations. The parent company is Data Communications Corp.

IST didn't really set out to evaluate various minis and their operating systems with an eye to which would be most suitable for Cobol, but rather used its experience with Novas.

The firm isn't considering offering Cobol for other makes of minis because the compiler and the transaction-processing package are written in Assembler, which would require significant work to convert, Maehling said. However, the applications would not be that hard to convert.

The IST Cobol requires a minimum configuration of 16K words. Most of the firm's installations are on Nova 3s or 210s and some 840s.

"I don't know of any on the Micronova. It would be slow because of the floppy disks," Maehling commented. However, when bigger disks are hung on the Micronova, then Cobol will be feasible, he said.

IST offers a transaction system that permits foreground/background mode and use of remote terminals, he said.

IST Datasystems is at 2985 Vanguard Drive, Memphis, Tenn. 38131.

Not for Distributed DP

Educomp, a subsidiary of Quodata Corp. in Hartford, Conn., offers a version of Cobol on the PDP-8, but it is not intended for the distributed processing market because of its limitations, according to Myron Congdon, who handles marketing for the firm.

Educomp's Cobol requires 24K bytes and runs under DEC's OS/8 operating system or Educomp's Etos, which is a multilanguage time-sharing system, he said.

The Cobol was developed as a teaching tool, he explained, and lacks such features as the ability to handle over 12 digits in precision.

RPSS Focusing Energy on Bell Bill, FCC

(Continued from Page 57)

The Bell Bill has also been dubbed the "Monopoly Protection Act of 1977," Jackson added.

Weissman appealed to those in the remote processing services sector to write undecided congressmen about the bill and its possible effects on the industry rather than trying to dissuade those already supporting it.

As an indication of AT&T's efforts in promoting passage of the bill, Weissman said AT&T has a corporate vice-president whose sole responsibility is responding to congressional inquiries of a factual nature.

The Bell Bill has major implications for everyone in the U.S., he added. Marks observed that since the bill was launched on the emotional premise that residential phone rates will rise if it is not passed, all rational policy on telecommunications in the political arena has been clouded.

More Action

But the Bell Bill is not the only source of legislative action on the the communications front. The House Subcommittee on Communications plans to rewrite the Communications Act of 1934 and option papers should be available this week, according to Jackson.

The papers are a menu of options and detail how they would impact various areas such as broadcasting, cable television, domestic common carriers, international connections, privacy and spectrum management, he explained.

There will be further policy hearings; the new act is expected to be drafted late this fall, he said.

Jackson cautioned attendees to be aware that the prevailing attitude in Congress seems to be that since the FCC has been winning in the courts in areas relating to computers, this area is less pressing than cable TV and others.

James Graf, legal assistant to FCC Commissioner Joseph Fogerty, said the deadline for comments on the second Computer Inquiry's positions is May 16. The Computer Inquiry, being conducted by the FCC, is attempting to delineate what constitutes DP and what constitutes communications.

The FCC has made several recommendations to Congress, including the repeal of Section 222 of the International Communications Act and an amendment to the Communications Act of 1934 that would allow the FCC to take a leading role in negotiating in the international arena, he said.

The commission also tentatively recommended that Congress establish joint ownership of all international telecommunications facilities, including both satellites and cable, he said.

International Area

In the international arena, progress has been made in getting industry and user representation on several committees, according to Phil Onstadt, an attorney for Control Data Corp. who is in charge of RPSS' international efforts.

Although the X.25 standard on data communications has been passed by the Consultative Committee on International Telephone and Telegraph (CCITT), it now faces a host of changes, he said.

The initial standard was passed in skeletal form and he said, and at a recent meeting 87 changes were submitted by 40 countries.

"It will be an interesting time over the next four years," he added.

To funnel U.S. opinions about standards and other matters under the aegis of the CCITT, an American Preparatory Committee has been established which holds open meetings every three months. User participation is critical, he said, indicating notices of these meetings will be issued by Adapso.

The international rate structure scene could change, he said, since Italy has proposed volume-sensitive pricing.

The U.S. should be paying close attention to legislation abroad affecting privacy and security, Onstad said. Some countries, such as Sweden, are restricting the flow of certain data across borders, he noted.

The Council of Europe has a draft of a policy so restrictive on individual data that it would be "untenable" regarding international data services, he said.

The Organization for Economic Cooperation and Development (OECD) also has legislation under development, he said.

Onstadt suggested the State Department establish a government/industry advisory committee so it could be aware of how policies would affect various segments. One problem is that the U.S. doesn't really have a national policy regarding these aspects of comunications, he observed.

International News

International Marketing Ventures Active: Commerce

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — France and Japan, committed to strengthening their local computer industries, may be banding together in a cooperative development effort in this field, according to the U.S. Department of Commerce.

U.S. firms currently have 85% of France's mainframe business and 40% of Japan's, Commerce noted in a recent issue of *Commerce America.*

Japan has begun a major program to develop and refine large-scale integrated circuits for use in future processors. The French have reportedly proposed that they work with the Japanese in this area, *Commerce America* said.

France has offered to trade its state-of-the-art fabrication technology for Japanese information on other aspects of large-scale circuit production, the publication reported.

While France and Japan are seeking greater independence from U.S. vendors, Turkey and Egypt face an immediate need for expansion and improvement in their telecommunications systems, the department said.

A recent U.S. trade mission on a market-testing visit "uncovered excellent prospects for sales" to Turkey's and Egypt's government-controlled telecommunications systems, *Commerce America* stated.

Both Turkey and Egypt have six-figure waiting lists of citizens seeking telephones, for example, but they also seek an improvement in their total communications systems.

Egyptian government officials indicated a telecommunications master plan through the year 2000 is in preparation and there is a decided Egyptian interest in American equipment and systems, the Commerce Department said.

By 1980, Egypt expects to spend $2.3 million for 1,500 teleprinters; $10 million for a Cairo/Aswan microwave system; $15 million for earth stations for the Arab satellite system; and $10 million for computer-controlled message retransmission telegraph centers.

In other parts of the world, U.S. computer and data communications firms should continue to do well, the department stated.

British Demand Steady

British demand for U.S. computer technology hasn't lessened, despite the country's current economic difficulties, *Commerce America* reported.

U.S. exhibitors at a recent U.S. trade center show in London — Datacomm '77 — found the data communications field in the UK is expanding and developing rapidly.

This is largely because economic pressures have brought about the realization that only by increased efficiency can UK industry and commerce survive, Commerce stated.

While U.S. goods tend to be somewhat high priced in Britain, their technology outweighed their cost, the publication indicated.

Registered trade visitors concluded deals worth $1.5 million, and the 54 participating U.S. exporters estimate that, within the next 12 months, sales as a result of the exhibition will exceed $33 million, the Commerce Department indicated.

Products that appeared to have the best potential for sale at Datacomm '77 were microcomputers, minicomputers, high-speed modems, visual display units, disk drives, test equipment, network switching management systems, printers, memory boards and parallel interface extenders, the department said.

Meanwhile, computers and electronics are among key growth areas specified by the Soviet Union in its 10th five-year plan (1976-1980), the department stated.

The plan emphasizes new technology and raising the share of going into equipment instead of construction.

Machinery output is planned to increase 9% annually during the next few years, and computer hardware is among the product groups expected to grow most rapidly, the publication indicated.

Commerce America also noted Soviet planners are looking to increase their nation's use of automated systems — not only to raise production efficiency, but to reduce labor inputs.

Although no acute shortage of manpower is indicated until the 1980s, the present slower growth of the Soviet labor force evokes concern among USSR decision makers because, in the past, additions to labor and capital were the principal sources of the country's growth, the publication said.

While the Soviets' potential demand for imported industrial products greatly exceeds its hard-currency resources, a record USSR grain harvest in 1976 and increased economic activity in the West will increase the pool of money available for buying industrial products, Commerce stated.

High-technology areas, such as electronics and DP, are likely to be exceptions to strict Soviet foreign exchange rules, which tend to restrict industrial imports from hard-currency suppliers to producer goods which have no close Soviet-produced equivalent.

Soviet planners are willing to spend foreign exchange for the significant difference in quality they would receive in the computer field, Commerce suggested.

Sweden's Real-Time Services Ended?

WASHINGTON, D.C. — The era of real-time processing by DP services "has come and gone" in Sweden, according to Hans Sandstrom, marketing manager for Samdata AB.

In efforts to combat the very real competition offered by minicomputers to real-time services, Samdata has acquired a mini systems house and is preparing applications packages for specific industries, President Roland Lindqvist said.

Most of the data services business in Sweden is remote job entry rather than real-time, he added.

Samdata specializes in the construction, mechanical, newspaper and automotive industries.

The firm is owned by a group of savings banks and has a special group that provides services to the owners.

The trend toward minicomputers was prompted by the fact that minis can perform many real-time functions more cheaply than a service bureau can, while being available for some mundane applications as well, he said.

Samdata sells Data General Corp. Novas which are then linked off-line to its central IBM 370/155, 158 or 168, which it shares with the savings bank group, Lindqvist said.

The firm acquired the mini business in December and plans to make standardized systems for the industries in which it specializes.

However, such functions as order entry and accounting will be performed by Samdata, he added.

"We've lost one or two customers to minis in the last two years, but if we don't do something we'll lose more," he stated. "So we offer them a choice."

Foreign Orders & Installations

Four pharmaceutical distributors in Scotland and northern England (Ridley, Ltd., Hall Forster and Co., Ltd., James Taylor, Ltd. and Raimes, Clark and Co., Ltd.) plan to install a network of six NCR Corp. 8200 minicomputers, 30 CRTs and a Century 201 for on-line order entry and inventory control.

AB Iggesunds Bruk of Sweden has ordered two Measurex 2000 systems to control bleached board production on two of its paper machines.

Rijkswaterstaat, the Water Control and Public Works Department of the Dutch Ministry of Transport, is installing a Univac 1100/41 system valued at $5 million. A primary function of the system will be gathering large quantities of data concerning tidal fluctuations on the Dutch North Sea coast.

Le Material Telephonique of Paris has ordered Kennedy Co.'s Model 9000 and Model 9700 tape transports, accessories and data formatters to be used in part in its renovation of the Paris telephone system.

Axel Springer, a German publishing house, has ordered a Mohawk Data Sciences Corp. System 2400 key-to-disk system and custom software to be used for all precentral processing functions including the determination of authors' fees.

Allmanna Brand, a Swedish insurance company, has ordered a Univac 1100/10 system for handling cutomer policies, claims settlements and inquiries.

The Swedish Board of Civil Aviation has ordered an air traffic control automated system from Stansaab Elektronik AB to be installed at Sturup Airport, Malmo, beginning in 1980. The system will include automatic switchover capability in case of malfunction, and information will be supplied to 50 working positions via a Censor 900 information system consisting of a 932 computer, graphic and alphanumeric display units.

Clydesdale Bank of Scotland has ordered minicomputers from Varian Data Machines and terminals from Fortronic, Ltd. of Scotland for a teller terminal network linking 360 bank branches. It is expected to cost more than $6 million.

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But Below Fourth Quarter '76

IBM Sets Record for First Quarter

ARMONK, N.Y. — IBM reported a 5.3% increase in earnings accompanied by a 7.2% increase in revenue for the quarter ended March 31, setting a record for first quarters.

Wall Street, however, was disappointed in the results and IBM's price per share dropped 5-3/8 on the New York Stock Exchange.

The earnings increase was particularly disappointing in light of the 15% growth IBM witnessed in the fourth quarter of 1976.

It must be remembered, however, that the final quarter of a year is traditionally the strongest as salesmen rush to get in their orders before year-end.

Earnings for the period rose to $573 million or $3.82 a share compared with $544 million or $3.63 a share in the year-ago quarter.

Revenues reached $4.09 billion compared with $3.81 billion a year ago.

Trading in IBM stock on the New York Exchange was halted shortly before the company issued its financial report and did not resume for more than an hour and a half.

Financial analysts noted reaction to the quarterly report had an adverse effect on stocks of other DP firms and on the market as a whole.

Financial News

"Outright purchases of DP equipment were somewhat higher than the first quarter of 1976, but substantially less than the record purchase volume experienced in the final quarter of 1976," according to Frank T. Cary, IBM chairman.

"Demand for the company's products is strong, reflecting the continuing improvement in economic conditions in most of our major marketing areas around the world.

"Both shipments of and incoming orders for DP equipment were significantly ahead of last year's corresponding quarter," he stated.

NCR Earnings Jump 26% With 9% Revenue Raise

DAYTON, Ohio — NCR Corp.'s first quarter earnings jumped 26%, accompanied by a 9% raise in revenues.

Earnings rose to $16.6 million or 61 cents a share compared with $13.2 million or 54 cents a share in the year-ago period.

Last year's first quarter figure included a nonrecurring benefit of $5.6 million or 23 cents a share as a result of adoption of the Financial Accounting Standards Board (FASB) Statement No. 8, concerning the translation of foreign currency transactions and foreign currency financial statements.

Revenues for the quarter increased slightly to $515.3 million from $471.1 million for the comparable period last year.

Domestic revenues were up 11% and revenues outside the U.S. rose 7%.

William S. Anderson, chairman, attributed the earnings improvement to the company's U.S. operations, citing more favorable business conditions and reduced product costs which had a favorable impact on margins.

Overseas Markets

Outside the U.S., earnings were approximately the same as in last year's first quarter, reflecting the slow pace of economic recovery in many countries around the world, Anderson indicated.

"We are anticipating improvement in overseas markets as the year progresses," he said, "and look for stronger international results during the balance of the year."

Incoming orders for the first three months of 1977 exceed those of the prior year's first quarter and March bookings topped $200 million, a record total for any single month, he said.

"With the business outlook continuing to improve both domestically and abroad and in view of the many new product releases scheduled for this year, we are anticipating a high level of incoming business and favorable financial performance throughout the year," he stated.

IRS Tightens Rules

WASHINGTON, D.C. — The Internal Revenue Service (IRS) has adopted final standards tightening the "allocation-of-deduction" rules for multinational companies.

Previously, many multinationals charged some expenses and deductions attributable to foreign operations against their U.S. income.

This resulted in inflated foreign profit which, in turn, increased the foreign tax credit that companies could take to reduce U.S. income tax.

The new IRS regulations will generally force companies to match expenses more closely with their sources of income.

CDC First Quarter Results in 16% Increase

MINNEAPOLIS — Strong performance by all major segments of Control Data Corp.'s computer business resulted in a 16% earnings increase for the first quarter ended March 31.

Earnings for the quarter were $11.7 million or 67 cents a share compared with $10.1 million or 58 cents a share in the year ago period.

Computer business earnings contributed $3.6 million to the total compared with $827,000 in the first quarter of 1976.

Revenue for the period was $339.3 million compared with $306.6 million a year ago.

While the earnings gains were attributable to a strong showing by the services, systems and peripheral products, these gains were partially offset by lower net earnings in financial services (Commercial Credit) as a result of adverse foreign currency exchange rates, according to William C. Norris, chairman.

Commercial Credit earnings dropped from $9.3 million a year ago to $8.0 million for the first quarter of 1977.

Nickles & Dimes

General Computer/Systems' board of directors has authorized the purchase of up to 60,000 shares of the company's common stock in the public market for the treasury.

$$$

NCR will invest $105 million in R&D this year, up from $94.3 million in 1976, according to Chairman William S. Anderson. NCR will introduce 69 hardware and software products this year compared with 32 last year, he added.

$$$

Telenet Communications, a Bolt Beranek and Newman, Inc. affiliate, has completed the sale of $2.5 million in common stock to a group of institutional investors.

$$$

Computer Automation has declared an 8-cent semiannual dividend payable June 1 to holders of record May 10.

$$$

Itel plans to make a public offering of 2 million shares of cumulative preferred stock during the second quarter of 1977. Shares will be redeemable through a sinking fund, from 1983 to 2007, at $15 per share.

$$$

Boothe Computer Corp. has changed its name to Boothe Courier Corp. to reflect the importance of communications and terminals in its business.

$$$

Data 100 and **Comterm Ltd,,** both of Montreal, have completed their agreement to combine their remote batch terminal operations in Canada. Under terms of the agreement, Data 100 Services will pay Comterm an undisclosed amount of cash and other considerations and will market Comterm terminals.

$$$

MCI Communications has signed a revised credit agreement with its five lending banks. The guarantors' consents are valid only until July 1, 1979. For the new repayment schedule to continue in effect beyond that date, MCI must either have received in advance an extension from the guarantors of their consents to April 1984 or prepay by June 29, 1979, $20 million of the principal amount then outstanding. MCI's bank debt is currently $98.3 million.

$$$

Applied Digital Data Systems has declared the initial quarterly dividend on its $1 cumulative preferred stock.

Paradyne has completed three separate financing agreements valued at $8 million.

$$$

Optical Scanning has filed a Plan of Arrangement with the Bankruptcy Court in Philadelphia. The firm previously announced the sale of its Optical Scanning and Precision Business Forms divisions to National Computer Systems, Inc. for $3 million in cash, plus the assumption of about $1.3 million in liabilities and certain long-term leases.

$$$

Datatype has been declared bankrupt and an order issued directing that the case be continued as a liquidating bankruptcy case.

$$$

Dataproducts has declared a 10 cents per share dividend payable June 24 to holders of record June 7.

$$$

Tektronix has doubled its semiannual dividend to 30 cents a share payable May 9 to holders of record April 15.

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Microcosm

From Intel Corp.

4K, 16K RAMs Interchangeable

SANTA CLARA, Calif. — Intel Corp. has introduced a family of interchangeable 4K- and 16K-bit dynamic random-access memory (RAM) devices which it said can directly replace the industry standard 16-pin, 4K RAMs.

The 2104A and 2116 series are electrically and logically compatible, allowing 4K and 16K RAMs to be combined in memory systems, Intel said.

System producers therefore can tailor the system storage configurations and capacities for end users with no change in basic system design, operation, manufacturing or test methods, the firm added.

The Intel 2104A has a maximum access time down to 150 nsec and the 2116 has a maximum access time down to 200 nsec. The devices are guaranteed to operate at these speeds over a wide power supply tolerance of ±10% as well as over the full temperature range of 0°C to 70°C, the firm said.

Both series are compatible with 16-pin, 4K RAMs that were not mutually compatible in the past, such as 2104, 4027 and 4096 RAMs, Intel said.

The 2116 series can emulate such 4K operations as 64-cycle refresh and data output latching, the firm indicated.

Prices of the units in lots of 100 vary according to specifications. The 4K units range from $14.20 for 200 nsec access time to $9.95 for 300 nsec access time.

The 16K unit prices range from $62.50 to $47 for the same access times. Intel is at 3065 Bowers Ave., Santa Clara, Calif. 95051.

EMM Adds Core for Pace Micro

HAWTHORNE, Calif. — Electronic Memories & Magnetics Corp. (EMM) has a core memory system that will interface with National Semiconductor Corp.'s Pace units for applications where nonvolatile memory is required in programmable process controllers.

The memory, Micro 3800, is an 8K by 16 random-access core system on an 8.5- by 11-in. printed circuit card and features a 400 nsec access time.

It operates from unregulated voltages typically encountered in industrial environments, EMM said.

Worse case power consumption is less than 40 watts and standby power is less than 10 watts. The memory operates from 0° to 50° without degradation in performance, the firm said.

In lots of 100, the 3800 costs $895 from EMM's Memory Products Division, 12621 Chadron Ave., Hawthorne, Calif. 90250.

A Release for Laughter

Although persons reading about micros probably studiously dissect the specs, sometimes releases such as this one should be read for enjoyment rather than for information.

SANTA ANA, Calif. — A microprocessor system designed to cut response times and increase throughput at distributed data processing centers has been announced by Rowze Associates, according to company president Ed Associates.

Use of the system, designated the Samm I (So many Applications More better Managed), allows users to batch process all their distributed data processing applications at one, efficient centralized location, according to the company.

"Similarly, the machine can be used to batch process time-sharing and process control chores, a major step in efficiently utilizing current computer hardware/technology trade-offs," vice-president Fyerinicey ("Red") Rowze said.

The microprocessor system, built around a unique 15-pin configuration on a 0.5-in. center, is of the type classed "paranoid" by the computer industry.

Rather than looking ahead to the next sequential instruction as do competing machines from companies like IBM, Digital Equipment Corp. and the semiconductor manufacturers, paranoid machines constantly look back over what they already have done to see if what their programming fears can go wrong actually has.

These types of machines are expected to find wide use in weather prediction, the preparation of airline food and on the assembly line in Detroit. Software for the Samm I includes a 5K debugger.

Samm I operates on an internal cycle time of 9,000 MHz, a speed the company proudly noted "will eliminate any interference from any test and instrumentation gear in use during the critical phase of systems integration."

Internal configuration is based around a 17-bit word, an arrangement which is "just a little bit better than the competition's and which will put a whole new slant on systems design in the future," according to Izeno Yokasawa, chief engerneer.

The internal architecture of the machine is characterized by a number of innovations. For example, all I/O data lines can be directly connected to the memory-enable lines to generate an interrupt whenever the memory or a peripheral is accessed by the CPU.

This concept promotes interrupt nesting, since anytime the CPU goes to memory — even to begin trying to determine what caused the initial interrupt in the first place — another interrupt will be generated and the process automatically repeated, the firm observed.

Sequential Random Access

All I/O operates under the command of a Sequential Random Access Method, a piece of control software requiring only 1.7M words of additional main memory storage. Expansion boxes to handle this memory are provided with each system in the form of a 10- by 10- by 20-ft steel room.

At present, only core memory is available with the system, although the company anticipates 64K semiconductor memory devices will be available shortly.

These memory components will be designed according to FAA standards and will fit under a coach seat, the firm added.

As an option, users can configure a Samm I system with an integral bit generator that will randomly invert bits in data or instructions.

Use of this generator will allow the machine to automatically perform something that programmers have been doing manually for years.

Also available is a data communications option in the form of a bag of 100 dimes.

Pricing depends on configuration. Bidding starts at $1.15 in single-unit quantities. Delivery is off the wall, FOB Palermo, Italy. Dealer prep charges and all applicable taxes and/or kickbacks not included.

For further information contact Rose Associates, 540 Golden Circle Drive, Santa Ana, Calif. 92705. If you decide to visit, bring rain.

Cards Make Up Multiprocessor

SANTA CLARA, Calif. — National Semiconductor Corp. has assembled a family of compatible microprocessor and memory applications cards to form a microcomputer capable of multiprocessing and direct memory addressing, according to the firm.

Based on the 8-bit, single-chip SC/MP microprocessor, the cards are said to reduce development times.

The basic CPU card is the ISP-8C/100 with the microprocessor, 256 by 8 bits of random-access memory (RAM) and room for 512 bytes of read-only memory (ROM).

It also includes a latched 16-bit address bus that permits selecting up to 16 memory pages as well as specific locations within the page, National said.

Two separate ports allow input and output of RS-232-type serial data. There are also three output and two sense input signals that are program-controlled.

Up to three CPU cards with a memory of 64K words give multiprocessing capability and ROM, programmable read-only memory (Prom) and RAM can be mixed in any configuration, the firm said.

The ISP-8C/100 SC/MP CPU card costs $250 each in quantities of 24 and $238 each in larger quantities from National Semi at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Intel Enlarges SBC 80 Family

SANTA CLARA, Calif. — Intel Corp. has expanded its line of memory and I/O expansion boards interfacing with any SBC 80 single-board computer or any System 80 packaged microcomputer, according to the firm.

The five boards interface via the system bus. The SBC 104, 108 and 116 offer 4K-, 8K- and 16K bytes of random access memory (RAM) respectively.

Typical access time is 485 nsec and the typical read/write cycle time is 560 nsec, Intel said.

The SBC 517 is a combination I/O expansion board with 48 programmable parallel I/O lines and an RS-232C programmable serial channel, according to the company.

The SBC 519 provides 72 programmable I/O lines which can be expanded via direct bus interface, the firm indicated.

The SBC 517 costs $425 and the 519 costs $395 from The Computer Systems Group of Intel's Microcomputer Division at 3065 Bowers Ave., Santa Clara, Calif. 95051.

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WANG

Production models of the IPL Systems, Inc. processor have been delivered to Control Data Corp. CDC will offer the processor, in the range of the 370/148 and 145, as part of its Omega Financial Plan.

Executive Corner

- Dr. John C. Sawhill, president of New York University, has been elected to the board of directors of Automatic Data Processing, Inc.
- John F. LaBarbara has been elected chairman of the board, Randal Data Systems, Inc.
- Jill Ker Conway has been elected to the board of directors of IBM World Trade Americas/Far East Corp., which conducts IBM's business in 45 countries.
- James D. Hodgson, former U.S. Secretary of Labor and ambassador to Japan, has been elected to the Hewlett-Packard Co. board of directors.
- Data Processing Security, Inc. has reelected Louis Scoma, J.C. Matlock Jr. and Quin L. Calhoun to its board of directors. Newly elected is Dr. James L. Boyd.
- Dr. Howard L. Yudkin has been named president of the Systems Division of Computer Science Corp.
- John Carr has been named president and chief executive officer of Trivex, Inc. and Richard J. Martin has been named vice-president of marketing.
- Daniel J. Krauklis has been named president of Office Electronics, Inc.
- Leland H. Amaya has been elected president of Securities Industry Automation Corp.
- James H. Pyle has been appointed president and chief executive officer of Periphonics Corp.
- Sun Yet Wong has been named corporation treasurer for System Development Corp.
- Thomas H. Elrod has joined Pertec Computer Corp.'s Data Systems Operations Division as division vice-president and general manager.
- Vince Hamill has been elected vice-president of National CSS.
- Peter D. Colgan has been appointed vice-president of Computer Horizons Corp.'s OEM Division.
- Richard Kaufman has been named vice-president of marketing and William J. Ackley general manager of Applied Digital Data Systems, Inc. In addition, Robert A. Degan has been appointed executive vice-president.
- Kevin R. Weaver has been made vice-president of marketing for Scientific Time Sharing Corp.
- Robert L. Reimers has been elected vice-president of Logic, Inc.
- Earnest J. Sasaki has been appointed executive vice-president of MDB Systems, Inc.
- Manuel G. Funtall has been named vice-president, Western region, for Software International Corp.
- Hubert G. Humphrey has been named vice-president and area manager in National Sharedata Corp.'s Midwest Division.
- Geoffrey F. Meakes has been promoted to vice-president, engineering, at Racal Communications, Inc.
- Larry R. McKeown has been appointed vice-president of finance for Trendata Corp.
- R.A. Bishop has been appointed assistant vice-president of international marketing for Incoterm Corp.
- Mario Vincent Caponegro has been appointed assistant vice-president of Data Access Systems, Inc.
- Dennis M. Mannion has been appointed vice-president, field engineering, for Documentation, Inc.
- John P. Macri has been appointed staff vice-president of Telecommunications and Computer Services, RCA Corp.
- John A. Sismondo has been appointed vice-president of marketing for Adamsystems.
- W. Ferrell Sanders has been elected a vice-president of Shugart Associates.

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Orders & Installations

BCS Richland, Inc., operator of the Energy Research and Development Administration's central computer system, has ordered a dual large-scale Univac 1100/44 system, software and services valued at $9.25 million.

Haner Enterprises and P.D.O.S. Security Systems have ordered a computerized central security system, including an alarm processing system implemented on an Imsai I-8080 microcomputer with Shugart disk drives, from Polaris Computer Systems.

Maritime Telegraph and Telephone Co., Ltd. of Halifax, Nova Scotia, has installed a facilities and equipment system from Computer Consoles, Inc.

Hanscom Air Force Base in Lexington, Mass., has ordered a 32/55 system from Systems Engineering Laboratories, Inc. with an option to purchase three more. They will be used to simulate on-board F-4 avionics systems using operational flight programs.

Cowlitz County in the state of Washington is installing a Univac 90/30 system at its Kelso courthouse for on-line administrative applications.

Pizza Hut, Inc., has ordered seven Datapoint 1132 intelligent terminal diskette systems and 4220 systems for dispersed processing field tests in area offices.

The Philadelphia Inquirer and the *Philadelphia News*, sister publications, have ordered System Development Corp.'s Text II computerized text processing system for production and accounting operations.

Business Computer Systems, national supplier of DP services to casualty and property insurance companies, has ordered 25 Sycor, Inc. 440 distributed data entry and processing systems to be installed in its customers' offices.

Wachovia Services, Inc., a financial DP company for banks and commercial businesses, is installing two NCR Criterion 8570 computers.

The Social Security Administration has ordered two local terminal controllers, a remote controller, 75 interactive display terminals and 21 medium-speed printers from Computer Optics, Inc. to be used in a time-sharing application.

The Federal Aviation Administration has ordered a Honeywell 60/66 system for engineering and administrative functions at the National Aviation Facilities Experimental Center at Pomona, N.J.

The George C. Marshall Space Flight Center in Huntsville, Ala., has ordered a Systems Engineering Laboratories Model 32/55 system.

Levi Strauss & Co. of San Francisco has ordered a Computer Communications, Inc. CC-80 communications processing system to handle corporate message switching requirements.

Contracts

Logicon, Inc. has received two contracts from the Air Force Systems Command's Space and Missile Systems Organization totaling $4.5 million for continued software support on the Minuteman III intercontinental ballistic missile program.

Recognition Equipment Inc. (REI) has signed a two-year, $4 million contract with Harris Computer Systems Division for Slash 5 computers for use in two of REI's major systems.

Shugart Associates has signed a $3.5 million contract with Mohawk Data Sciences for Shugart Model SA800 floppy disk drives.

EMI Electronics Ltd. of Wells, England has been awarded a $3.06 million contract by British Rail to develop and manufacture the production prototype equipment for an advanced automatic ticket inspection and barrier control system.

Calcomp Canada has signed a $3 million, three-year contract with the Province of Quebec for the lease of disk memory systems providing 28 billion bytes of on-line data storage.

Banking Systems, Inc. has been awarded a DP management contract from the First National Bank in Albuquerque, N.M.

Atlantic Research Corp. has been awarded a $2.2 million contract by TDX Systems, Inc. for the production of remote call processor units for use with their Telemax Telephone Management and Control System.

Logicon, Inc. has received a $2 million contract from the Air Force Systems Command's Space and Missile Systems Organization to conduct independent verification and validation of computer software for the Advanced Maneuvering Reentry Vehicle.

New Companies

Alco Leasing, Inc. has been formed to serve the leasing market. The firm specializes in leasing DP and data communications equipment as well as high-technology equipment and machinery for manufacturing plants.

The firm is located at P.O. Box 154, Park Ridge, N.J. 07656.

BSI Management Consultants has been formed to offer services in DP, management, accounting and labor relations.

Robert Colucci is president. BSI is at 320 12th St., Hammonton, N.J. 08037.

Distributed Systems Architects, Inc., a consulting firm that specializes in solving distributed DP problems, has been formed.

W. Fred Seigneur is president. DSA is located at 453 Bowling Green Drive, Montgomery, Ala. 36109.

The Butler Cox Foundation has been established to conduct specialist research in computer systems, telecommunications and office automation.

David Butler is chairman. The foundation is located at The Press Centre, 76 Shoe Lane, London EC4A 3JB, England.

Pathfinder Consultants, a business consulting firm specializing in medical devices and computer industries, has been formed. The firm assumes responsibility for projects relating to technology, marketing, business planning and finance.

The company is located at Southgate Office Plaza, Suite 800, 5001 West 80th St., Minneapolis, Minn. 55437.

Decision Strategy Corp., a software company specializing in real-time software, has established a services subsidiary and a consulting division.

Both are located at 708 Third Ave., New York, N.Y. 10017.

POSITION ANNOUNCEMENTS

SALES

We are looking for that one, right sales professional to sell our well-established SYSTEMS III products to end-users as well as to select, support and assist area dealers. For that one, right individual, this is a truly unique and unusual opportunity for career and financial growth. To be considered, applicants must have prior sales/marketing experience in the mini-computer and/or small computer business systems marketplace. Compensation will include base salary plus incentives, a company car and a liberal employee benefit package. Send detailed resume including current earnings to our Employment Manager.

Local Interviews

CW Box 4982
797 Washington Street
Newton, Mass. 02160

An Equal Opportunity Employer M/F

Programmer II

DEC 10 Programmer

Duties include development and implementation of programs for system access control, usage accounting and monitoring; installation and maintenance of data base management software; implementation and maintenance of data entry software on PDP-11 computers.

Qualifications required: h.s. degree and at least one year post h.s. education including relevant courses; at least three years programming experiences on a DEC 10 system, demonstrated ability to program in MACRO-10 and thorough knowledge of TOPS-10 file systems.

Forward resume no later than May 23, 1977 to Carl Hamrin, Kingsbury Hall, University of N.H. Durham, N.H. 03824. *An affirmative action/equal opp employer.*

Data Processing, MANAGER OF FINANCIAL & DATA BASE SYSTEMS. The Univ. of Calif., San Francisco, Hospitals & Clinics, is seeking a Manager for its financial & data base systems. This position reports to the Director of Hospital Information Systems & has responsibility for the management & supervision of the hospitals' financial data system using the campus' IBM 370 computer. Responsibilities will include the planning, development & implementation of a data base management system as well as significant revisions of the hospitals financial systems. Requirements: min of 3 yrs exp in hospital financial systems, 3 yrs exp in the supervision & management of computer systems & technical staff; ability to perform systems analysis, design & programming, preferably in the area of hospital financial systems; Bachelor's degree in an appropriate field. Salary commensurate with qualifications. Send resume with salary history & cover letter outlining qualifications to Employment Division, Third & Parnassus Ave., Rm. U-12, UNIVERSITY OF CALIFORNIA, San Francisco Campus, San Francisco, CA 94143. Affirm Actn Emp M/F

position announcements | position announcements

FLORIDA C.P.C.S.

Check Processing Control Systems Specialists URGENTLY NEEDED for several true growth situations. Starting salary to $22,000 with superior benefits. Contact Richard Maddock:

FRANK LEONARD PERSONNEL
1211 N. Westshore Blvd.
Suite 100
Tampa, Fl. 33607
(813) 872-1853

BURROUGHS

B6700 PERSONNEL

Small university in Northern California with Burroughs B6700 has openings for the following positions:

Operations Manager	$15,000
Programming Manager	$18,000
Sys. Software Prog.	$18,000

Only send resume if you have experience on the Burroughs B6700. Send to:

Jerry A. Springer
Dir. of Computer Services
University of the Pacific
877 W. Stadium Drive
Stockton, CA 95211

GECOS

If you are interested in relocating to the beautiful Pacific Northwest, we currently have an excellent position for an EDP professional with GECOS internals experience.

Data Base Admin . . . to 30K

Contact Jim Morris or Bill Parfitt. Houser, Martin, Morris and Associates, 1621 114th S.E., Suite 219, Bellevue, WA 98004 (206) 455-9600.

T.P. SPEC.

E. Coast Corp. with lg network seeks indiv. with IBM T.P. software exp to direct network expansion. Salary to $23,000 + (Fee paid). Contact Stan Durbas for details.

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

PROGRAMMER ANALYST

Must have heavy NCR experience in COBOL and/or NEAT/3. Top salary commensurate with experience. Excellent personal and professional growth potential. Full company benefits including profit sharing and employee discount. Send resume including salary history to:

Mr. D. Messer
JByrons
15600 N.W. 15th Ave.
Miami, Florida 33169
Equal Opportunity Employer

PROGRAMMERS/ANALYSTS

The Dayton area's largest and most progressive financial institution has openings for experienced Programmers and Systems Analysts.

Two years NCR NEAT/3 or NCR COBOL experience desired. Experience with CIF, CIRF and/or commercial bank applications preferred.

We offer an excellent starting salary plus an outstanding fringe benefit program. Send resume to:

Personnel Division
Winters
National Bank & Trust Co.
Winters Bank Tower
Dayton, Ohio 45401

Affirmative Action Equal Opportunity Employer

VICE PRESIDENT MANUFACTURING

$35,000 plus

COMPANY:
A solidly established, leading manufacturer of high performance, custom designed, complex computer systems, located in desirable New Hampshire, with world wide markets.

OPPORTUNITY:
Complete responsibility for all production including supervision of systems sub assembly, materials, manufacturing (100 people). Report directly to President.

QUALIFICATIONS:
A well rounded Manufacturing Manager with solid line management experience, familiarity with innovative materials management systems, Computer Systems Integration configuration, Subassemblies. Experience in balancing a complex manufacturing system. Knowledge of manufacturing large distributed process systems helpful. "Hands On" management.

ACTION:
Contact Alan Glou in complete confidence with a detailed resume showing current salary and accomplishments.

alan glou
associates
P.O. Box 601
Needham, Mass. 02192
personnel consultants (617) 449-3310

DATA PROCESSING PROFESSIONALS

ALL LEVELS

Leading national property & casualty insurer offers DP professionals career opportunities as project managers, project leaders, systems programmers and programmer/analysts through relocation to new DP facility in scenic Roanoke, Virginia. Pursue challenging and rewarding assignments in an environment that includes 370/158 VS, IMS, Data Base Administration, DEC Minis, Distributed Processing, TSO, VTAM, NCP and structured design and programming.

Reply in confidence to Dorothy Saxe. Manager, Personnel Services

The Atlantic Companies

Atlantic Mutual Insurance Company · Centennial Insurance Company
Property, Liability and Marine Insurance
Atlantic Building, 45 Wall Street, New York, NY 10005
Telephone (212) 943-1800
An Equal Opportunity Employer M/F

MANUFACTURING SYSTEMS ANALYSTS

NCR's Terminal Systems Division in Millsboro, Delaware has immediate needs for analysts interested in developing systems for both financial and manufacturing applications. We are a high volume manufacturing facility concerned with the production of POS terminals. We are currently in the planning stages for substantial increases in manufacturing activity starting late 1977.

Requirements are:

- **On-line inventory control, WIP, MRP and financial systems experience in a manufacturing environment**
- **Will design advanced EDP systems in the areas of material and production control as well as financial applications**
- **Programming knowledge required: prefer COBOL, Assembler, or NEAT/3 experience as well as data base (particularly TOTAL)**
- **On-line programming experience with ENVIRON/1 or Intercomm desirable**
- **Prefer a BS in CS, math, industrial engineering or related field with 1-5 years experience.**

In addition to an unparalleled career opportunity with NCR, our Millsboro location offers comfortable living in a scenic and uncongested coastal area. The finest marine recreational areas, wildlife preserves, and beaches are within minutes of our Millsboro facility.

If success interests you, please send your resume to:

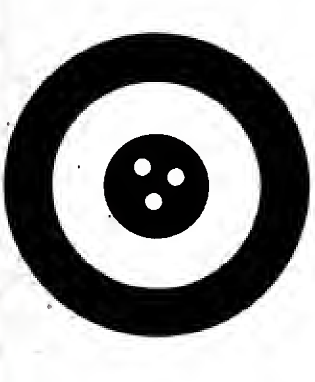
Mr. Ron Tull, Dept. CW -52
Terminal Systems Division - Millsboro
NCR Corporation
P.O. Box 607
Millsboro, DE 19966

NCR

An Equal Opportunity Employer

Programmers:

ONLY A SPECIALIST GETS SPECIAL RESULTS.



You're a specialist in your field. We are specialists in ours . . . computer career advancement. Neither job can be done by amateurs.

To score bull's-eyes in advancing your career, rather than to rely on yourself, you should take advantage of the specialized services offered by our career specialists. We have hundreds of exceptional opportunities, with inside information on each. We also have the sophisticated skills required to represent you most professionally and effectively. And all these services are free to you because employers pay our fees.

Get your career on target. Contact the NCA office in your area.

National Computer Associates

CHICAGO
McCormick & Associates, Inc.
386 North York Street
Elmhurst, Illinois 60126

DALLAS
Data Processing Careers, Inc.
Suite 1109
Stemmons Tower West
Dallas, Texas 75207

DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202

FLORIDA
Data Sciences Personnel, Inc.
Suite 205, 15490 N.W. 7th Ave.
Miami, Florida 33169

HARTFORD
Compass, Inc.
900 Asylum Avenue
Hartford, Connecticut 06105

LOS ANGELES
Constellation Enterprises
Suite 900, 3250 Wilshire Blvd.
Los Angeles, California 90010

MINNEAPOLIS/ST. PAUL
Electronic Systems Personnel
801 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402

NEW YORK
Botal Associates, Inc.
405 Lexington Avenue
New York, New York 10017

NORTH CAROLINA
TaskForce, Inc.
1046 E. Wendover Ave.
P.O. Box 6888
Greensboro, N. Carolina 27405

PHILADELPHIA
Systems Personnel
207 Fox Lane
Wallingford, Pa. 19086

PITTSBURGH
Electronic Systems Personnel
106 Lawyers Building
428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

SAN FRANCISCO
The Computer Resources Group Agency, Inc.
303 Sacramento Street
San Francisco, California 94111

SYRACUSE
CFA Associates Personnel, Inc.
(Agency)
2530 James Street
Syracuse, New York 13206

TULSA
Data Processing Careers, Inc.
Suite 10, Park 21 Building
2626 East 21st Street
Tulsa, Oklahoma 74114

WASHINGTON, D.C.
ESP Systems Corporation
Suite 210
1211 Connecticut Avenue N.W.
Washington, D.C. 20036

Computer Personnel Firms interested in NCA Membership, write to: J. McNamara, 2990 W. Grand Blvd., Detroit, Mich. 48202

Software Systems Consultant

Fortune 500 financial organization has multiple openings for Systems Consultants to conduct product development and evaluations. Software systems background should include extensive exposure to IMS, TP, or OS/MVS or Magnetic Ink character Recognition (MICR) processing Salary to $25,000.

Systems Analyst

The same organization seeks unique individuals who have had exposure to large systems, MP 360/370, OS/MVT'MVS, JES-3. Qualified applicants will possess a minimum 3-5 years' programming and analysis experience in a commercial environment. Well rounded business orientation and strong communication skills are required. This opportunity offers an excellent benefit package and a salary to $20,000.

LOGICAL OPTIONS INC.
233 Sansome St. Suite 1300
San Francisco, Cal. 94104
(415) 781-0844
An Employer Paid Personnel Service

PROGRAMMER ANALYSTS

MIS division of multi-billion-dollar corporation with 18 nationwide computer installations requires professionals with systems development, from design to line code and nationwide installation, capability for NYC and/or Boston areas in 370/158, TSO, IMS, CICS/VS supporting 4,000 terminals environment. COBOL and OS JCL expertise plus strong communications skills a must. Opportunity for creativity, challenge, growth. Excellent benefits. Send resume with salary history to:

CW Box 5011
797 Washington St.
Newton, Mass. 02160
Equal Opportunity Employer M/F

ANALYST/PROGRAMMER

Responsible for design and programming of an automated management information systems (MIS) with particular emphasis on financial management and integrating newly developed subsystems with existing student information system. Prepare procedures manual. Potential involvement with academic computer science department.

Required: ability to become lead programmer; previous design experience and two years COBOL; accounting background. Prefer person with experience with DBMS within an academic setting.

Send resume to: Ms. Patricia Phillips, Director of Administrative Computer Services, Aquinas College, 1607 Robinson Rd., Grand Rapids, Mich. 49506.

Equal Opportunity Employment

DATA PROCESSING

(ALL LEVELS)

We are assisting several companies in their search for qualified personnel. Systems & programming people with Data Base or On-Line expertise, Salaries $14-$26,000. Software technicians familiar with IMS, OS or VOS, range from $18-$27,000. Systems Analysts familiar with manufacturing, retailing or banking applications, up to $26,000. Excellent opportunities for programmer analysts with 1 or more years experience, salary $14-$19,000. All positions - are fee paid.

Call or write. All replies will be dealt with in a professional manner.

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Kroger Bldg, Suite 2301
Cincinnati, Ohio 45202
(513) 241-1255
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SYSTEMS ANALYST/SYSTEMS ANALYST PROGRAMMERS

General Computer Services, Inc., a leader in Software development, is seeking several highly qualified individuals.

The candidates for Systems Analyst position must have in-depth knowledge of banking applications; payroll experience required.

The candidate for Systems Analyst Programmer must have a minimum of two years experience in COBOL; 360/370 experience required; financial experience required; payroll and OS experience desirable.

The positions to be filled are at the Company Headquarters in Huntsville, Alabama.

Send Resume To:

Personnel Department
General Computer Services, Inc.
P.O. Box 5148
Huntsville, Alabama 35805

SENIOR SYSTEMS PROGRAMMER

Our expanding Technical Support staff in Suburban Minneapolis needs a self motivated individual with the following qualifications:

- * Sysgen experience in SVS, VS1 or MVS in a multiple CPU environment
- * MVS maintenance experience

The following additional qualifications would be desirable:

- * 4-6 years systems programming
- * Knowledge of MVS internals
- * NCP/VTAM knowledge
- * CICS exposure
- * VS1 to MVS conversion experience

We offer an excellent benefit and compensation package. Send your resume and salary requirements to Personnel Department:

TARGET STORES
1080 73rd Avenue N.E.
Fridley, Minnesota 55432

TARGET

An Equal Opportunity Employer

Systems Development

Our newly-formed Commercial Small Systems Group has several attactive openings for individuals who have:

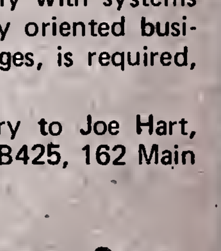
- assembly language programming skills
- experience with systems programming (preferably on commercially oriented systems or turnkey system packages)
- a desire to develop human-engineered user-oriented commercial systems.

You'll be involved with the development of systems that deal with intelligent terminals and networks in a commercial environment. These high-visibility positions offer extensive exposure to diverse new areas.

2-10 years related experience, preferably with systems programming exposure on commercially oriented business systems or turnkey system packages, is required, and a BS, MS, or equivalent is preferred.

Forward resume outlining salary history to Joe Hart, Digital Equipment Corporation, Dept. B425, 162 Main Street, Maynard, Mass. 01754.

We're the company looking for people.



digital
digital equipment corporation
an equal opportunity employer m/f

SYSTEMS ANALYST

Distributed processing forecasted to be the fastest growing segment of the computer industry over the next 10 years. The recent merger of CMC and Pertec has resulted in our company becoming the leading manufacturer of data communications and distributed processing data entry systems in the world. These factors create excellent opportunity for a sales oriented systems support individual who is looking for a career growth position with a solid, rapidly growing company.

We are looking for a Systems Analyst to join our systems support group to provide headquarters support for our field organization.

Responsibilities will include generations of technical information for the field, development of support tools, field support and education for CMC personnel and customers.

The successful candidate will have prior experience working with distributed processing/intelligent terminal systems and have a technical background in cobol programming, file management applications knowledge and data communications. Previous system support experience with a manufacturer of computer systems is highly desirable. Travel is required.

We offer an excellent starting salary with full company paid benefits. For prompt consideration, please send your resume, including salary history, to:

Personnel Department
P.O.Box 92300, Los Angeles, CA 90009
An Equal Opportunity Employer M/F

CMC
a division of
PCC PERTEC COMPUTER CORPORATION

SYSTEMS ANALYST/PROJECT LEADER
PROGRAMMER ANALYSTS
PROGRAMMERS

THE EQUITABLE TRUST COMPANY, a billion dollar Baltimore Bank is looking for experienced EDP candidates with good communication skills to apply their problem solving ability within an IBM 370/158 OS/VS environment.

SYSTEMS ANALYSTS/PROJECT LEADER

6 years D.P. experience to include programming and supervisory experience. Must understand concepts and facilities of IBM 370 system design. Banking experience necessary.

PROGRAMMER ANALYST

4 years D.P. experience to include: Project control experience, COBOL, strong OS/JCL, and exposure to ALC. Should have system design capability. Banking experience preferred.

PROGRAMMER

2 years D.P. experience to include COBOL and OS/JCL. Should desire to enter a banking career.

If you are a goal oriented professional looking for a career path in data processing, please submit resume and salary requirements to:

THE EQUITABLE
TRUST COMPANY
Employment Department
P.O. Box 1556
Baltimore, MD 21203

Equitable
Trust Bank
The Equitable Trust Company, Baltimore, Md.

The Office of the Los Angeles County Superintendent of Schools has recently published the Honeywell 66/80, and as a result, new technical positions, never before needed, have now been created.

DATA BASE ANALYST

to be responsible for the development and maintenance of a system of technically complex files and records, to assure that existing and new data are consistent with one another.

TELEPROCESSING ANALYST

to develop and maintain a programming network of communications between the main computer and approximately 250 terminals located throughout the county.

OPERATIONS ANALYST

to develop and maintain efficient operations methods for all data entry, data control, and computer operations functions; to trouble-shoot potential problem areas, assuring that all hardware operates as efficiently as possible.

Qualified candidates will have two years of college plus four years of responsible Data Processing experience involving the use of COBOL, including specific experience in the technical field for which applying. Additional experience can be substituted for the college education.

To apply for these challenging, well-paying positions, offering security, professional freedom and growth in a dynamic, progressive environment, call (213) 922-6314. Official applications must be on file by May 20, 1977.

OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS

9300 E. Imperial Highway
Downey, California 90242
We are an Equal Opportunity, Affirmative Action employer. Minorities and women are encouraged to apply.

DIRECTOR
DATA PROCESSING

Opportunity to apply your management expertise to a sophisticated, centralized data processing environment. Responsible for 150 employees, $5 million budget, IBM 370/168 (MVS,IMS) with heavy teleprocessing involvement.

Our data processing facility provides services to the government of Hennepin County located in Minneapolis, one of the prime quality of life urban areas. You can enjoy a full four seasons of recreational and cultural activity in Minnesota's Twin Cities of Minneapolis and St. Paul while at the same time assuming the primary role in shaping the future of data processing in Hennepin County.

You will work closely with a top notch team of technical, systems development and operations professionals to accomplish significant organizational commitments to develop and enhance systems in applications areas ranging from Social Services, Criminal Justice, General Government Services and Health. Accomplishment of these commitments requires an individual with demonstrated leadership capabilities in the data processing field.

The successful candidate will have a college degree and substantial large computer systems planning and management experience. In addition, the candidate must possess superior written and oral communication skills and an effective approach to maintaining productive working relationships with users.

If your background matches what we are searching for, send your resume including salary history and accomplishments in confidence to:

David Waage
A-3 Government Center
Minneapolis, MN 55487

HENNEPIN
COUNTY

MANAGER
AUTOMATIC
DATA PROCESSING

The Los Alamos Scientific Laboratory, a national research organization, is seeking a degreed professional with extensive experience in administrative data processing. Demonstrated ability in the effective management of a professional staff is essential.

The successful candidate will be responsible for planning, organizing and directing the Administrative Automatic Data Processing Systems Group which is responsible for the analysis, design, programming, documentation, installation, and maintenance of major administrative data base systems. This will include coordination of user needs; feasibility studies; establishing lines for effective communications; education of the user community.

los alamos
SCIENTIFIC LABORATORY
OF THE UNIVERSITY OF CALIFORNIA

Send complete resume to or request application from:

R. Lynn Wilson
Recruiting Director
Division - 77-DD
Los Alamos Scientific Laboratory
P.O. Box 1663
Los Alamos, N.M. 87545

An Affirmative Action/Equal Opportunity Employer
Miniorities, Women, Veterans, Handicapped, Encouraged to Apply
U.S. Citizenship Required

SEATTLE

We are West Coast's leading outdoor sports equipment retailer with headquarters in Seattle, Washington. Due to recent expansion of our retail operations and up-dating of our inventory control systems we need persons with the following expertise:

Computer Operator - one or more year's experience on NCR B-3 Operating System.

Programmer - NCR NEAT/3 Levels I and II required on Line A, plus minimum 2 yrs. experience.

Candidates should forward resume and salary information to Personnel, P.O. Box 22088, Seattle, WA. 98122, by May 15, 1977. Equal Opportunity Employer.

ATCO

...an exciting data systems challenge

ATCO, an international leader in pre-engineered shelter, has been as exciting as its projects around the world. While the ATCO name and reputation have been built on industrial camps, they're only part of the story. Schools, colleges, medical centres, hotels, modular homes, office complexes — that's the other part.

We require several key people in our Systems and Computer Services who will be instrumental in designing, programming, documenting and implementing commercial applications utilizing BASIC/PLUS on a OEC 11/70.

Senior Programmer/Analyst

You'll perform all programming tasks required to enhance the performance of programming and operations. Previous experience with DEC software a definite asset.

Senior Systems/Analyst

You'll have a proven record in a business systems environment and possess a solid background in documentation and implementation of commercial applications.

Salary and relocation costs commensurate with experience. Reply in confidence with detailed resume stating salary requirements to:

DAVE SNOOK
ATCO Industries Ltd.
1243 MCKNIGHT BLVD. N.E.
CALGARY, ALBERTA. T2E 5T5
403-276-1101

EDP OPPORTUNITIES

COMMUNICATIONS Anal-spec'l proj – $30K
PROJ MGR Ginnie May-OS 370 staff 9 – $26K
CNSLNT -mini/mid range computer, fincl – $28-32K
MGMT SCI Fortune Co. PDP 10-Fortran – $25K
VM Software Support Anal – $23K
CHICAGO mgr manuf systems, shop MRP – $22K
BOSTON sys/ANA 370 DOS Cobol/Bal – $21K
OS Cobol Bal prog anal-lrn IMS – $19-23K
DOCUMENTATION Anal-EPD oper – $16-18K

Bill Borrelli (212) 349-3610
William Harris Assoc.
150 B'way agency NY 10038

COMPUTER SCIENCE

Assistant/Associate Professor with interest in operating systems, compilers and languages or software development. Effective Fall, 1977. Ph.D. and demonstrated teaching ability required. Candidates should submit a resume and three references to : Dr. Samuel S. Shapiro, Chairman, Department of Mathematical Sciences, Florida International University, Miami, FL. 33199. *An Affirmative Action/Equal Opportunity Employer.*

DALTON JR COLLEGE
INSTRUCTOR BUSINESS COMPUTER PROGRAMMING

Requirements: Candidate must have B.. degree in Business Computer Science or related field with minimum of two years work experience in industry.
Salary Range: $13,000 B.S.; $14,000 M.S. depending on experience.
Deadline: Applications will be accepted thru May 16, 1977. Expression of interest should include comprehensive resume and transcripts. Position available June 13, 1977.
Contact: Larry Little, Chairperson, Div. of Vocational-Technical Education, Dalton Jr. College, P.O. Box 2168, Dalton, GA 30720. EEO/Affirmative Action.

Dallas Opportunities in Advanced Systems Development

Develop the next generation of multiprocessor-based computer control systems.

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Develop multiprogramming operating systems. Requires significant RSX-11D operating systems internals experience on PDP-11 processor (11/35 through 11/70).

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Design/project leadership in the development of advanced processor systems from hardware architecture to manufacturing process specification. Requires experience in multiprocessor architecture, stack architecture, micro-programming, and bussing strategies.

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Experience and implementation of interactive instructional applications is highly desirable. Experience with time sharing applications on HP and CDC systems desirable.

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Send resume to: Dr. Bobby R. Brown, University Computer Center, 229 Lindquist Center for Measurement, University of Iowa, Iowa City, IA 52242. *The University of Iowa is an Equal Opportunity Employer.*

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Aggressive marketing organization with offices in the New York Metropolitan area has several openings for innovative and creative people who have "state-of-the-art" knowledge.

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Individual must be a capable presenter and able to relate well to corporate management. Send salary history and requirements.

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HENNEPIN COUNTY

David Sier
A-3 Government Center
Minneapolis, MN 55487

SYSTEMS ANALYST

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PURDUE University's growing Computer Technology Dept. has two Assitant Prof. openings beginning Aug. 22, 1977. Candidates require doctorate at or near completion and capable of teaching in several of the following areas: languages (COBOL, FORTRAN, BASIC, RPG, PL/I, BAL), operating systems, Intro. to D.P., data communications, systems analysis, MIS, data-base systems, business systems. DP-related business and/or teaching experience highly desirable. Send vita to: Department of Computer Technology, Indiana Univ.-Purdue Univ. at Fort Wayne, IN 46805. An Equal Opportunity/Affirmative Action Employer.

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Working in our technical support function, these programmers will provide operating systems software to interface between computer hardware and applications programs. Additionally, you will be involved in providing communications hardware/software between headquarters and the field. You will also contribute to the evaluation of firm requirements with respect to cost effectiveness of various programs and packages.

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The individual we seek must possess a bachelor's degree in EE, IE or ME plus 5 years supervisory experience in quality, production or test in an electronics manufacturing operation.

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Candidates must possess large data base exposure, MIS, CICS or total background. We prefer a degree and heavy COBOL ORIENTATION. Typical applications exposure will include inventory control. BOM, payroll, etc. The successful candidate will have implemented and controlled the installation of a large data base as well as the above stated applications.

We offer excellent salary and fringe benefits, in addition to promotional opportunities.

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Data Base Specialist	IMS, IDS, TOTAL using COBOL	to 30K
Sr. Prog.	Business Experience, must have assembly on Minis	to 26K
Operations Mgr.	Production Scheduling, Operations Dist, 8-10 years experience	to 25K
Sys/Eng.	Text editing Newspaper PDP-11 Assembly	to 25K
Diagnostic/Prog.	Text editing, Mini Assembler, 2-8 yrs. exp.	to 25K
Programmers	PDP-11 RSTS or RSX-11M Network Comm	to 24K
Programmers	370 DOS/OS Financial and Mfg. Applications	to 22K
Sales	4 years Minis	to 22K
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Tech Writer	2 years software and other manuals experience, COBOL & Fortran knowledge	to 20K
Prog/Analyst	Data Entry, Text edit, Comm. Assembler-COBOL	to 18K
Prog/Analyst	370/158 COBOL - CICX	to 18K

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Minicomputers, terminal oriented data communications systems are where the excitement is. And Raytheon Data Systems is right at the forefront, developing new technology and new systems for some of the world's major commercial users. That's why we're seeking professionals with challenge in mind for opportunities like these at our Norwood headquarters:

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For general minicomputer design support in logic design and development. You'll be responsible for creating specification, troubleshooting designs and building engineering models. Peripheral interface experience — particularly with magnetic tape equipment — is a must, and experience in small power design would be helpful.

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3. Programming . . . To develop real-time software for minicomputer and microprocessor based intelligent terminals. Requirements include assembly language level programming experience.

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If you have the qualifications — with a minimum of two to four years experience — and are interested in finding out what the excitement is about at Raytheon Data Systems, send your resume and salary history to Mr. Arthur J. McMahon, Manager Professional Employment and Compensation, Raytheon Data Systems, *Dept. CW502,* ***1415 Boston-Providence Turnpike, Norwood, MA 02062.***

RAYTHEON

RAYTHEON DATA SYSTEMS

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The successful candidate will enjoy a professional environment, competitive salary, excellent benefits and working conditions. For consideration, send resume with salary history, in confidence, to Professional Employment, PM-1, Levi Strauss & Co., Two Embarcadero Center, San Francisco, Ca. 94106. We are proud to be an equal opportunity employer, m/f/h.

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NCR Data Processing Division has immediate openings for Programmer Analysts in:

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NCR

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BA, BS degree or equivalent in Computer Science or Accounting with speciality in computer applications and system development. 1-3 years experience as Systems Analyst in a Data Base/Data Communications environment. Work will include development of a broad range of business applications including on-line systems.

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These positions are the result of increased emphasis being placed on computer usage within our organization and represent an excellent opportunity to develop along with a developing function. If you would like us to consider you for one of these positions, please submit a resume with salary history to:

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Requires at least two years operations experience on Honeywell 6000 hardware.

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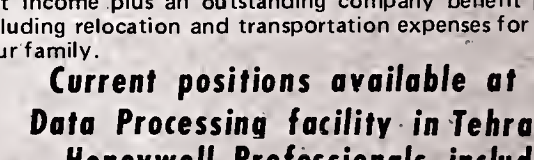

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Excellent opportunity to join our progressive organization for teleprocessing specialist with 5 to 7 years experience. Thorough knowledge of OS Assembler Language with VTAM, NCP/SDLC, PEP, BTAM and IBM 3705 hardware required. Exposure to IMS/VS and IBM 3790 hardware highly desirable. Responsibilities will include line loads and forecasting, designing operator procedures, training, TP equipment selection, and total design responsibility for all TP networks.

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field engineering

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Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

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You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your response.

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Amdahl Corporation
22150 Greenfield Road
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amdahl

Programmer/ Analysts

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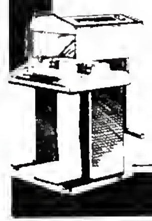
Salaries commensurate with experience, liberal benefit package, outstanding opportunities for technical advancement and/or movement into management. Please send resume and complete salary history in confidence to:

M.W. DePasquale
Assistant to the President



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To design, implement, document, and maintain assembly coded driver, interface and application modules for mini and microprocessor based retail point-of-sale terminal systems. Experience in assembly coded programming in a multi-tasking real-time executive based system or Intel 8080 or equivalent. BS in Engineering or Computer Science.

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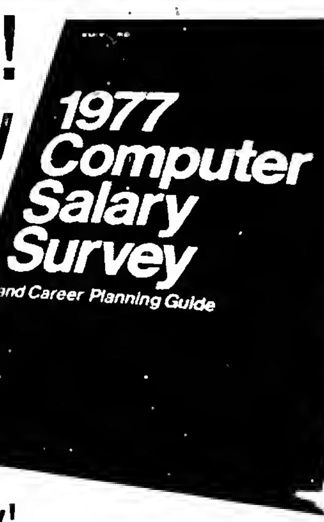

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(When writing, please be sure to indicate home address and current position title.)

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Placement Manager

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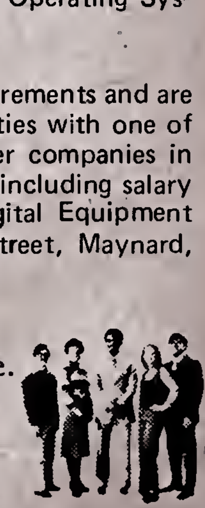

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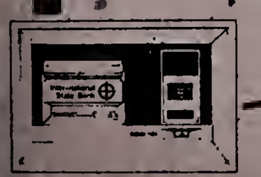

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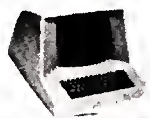
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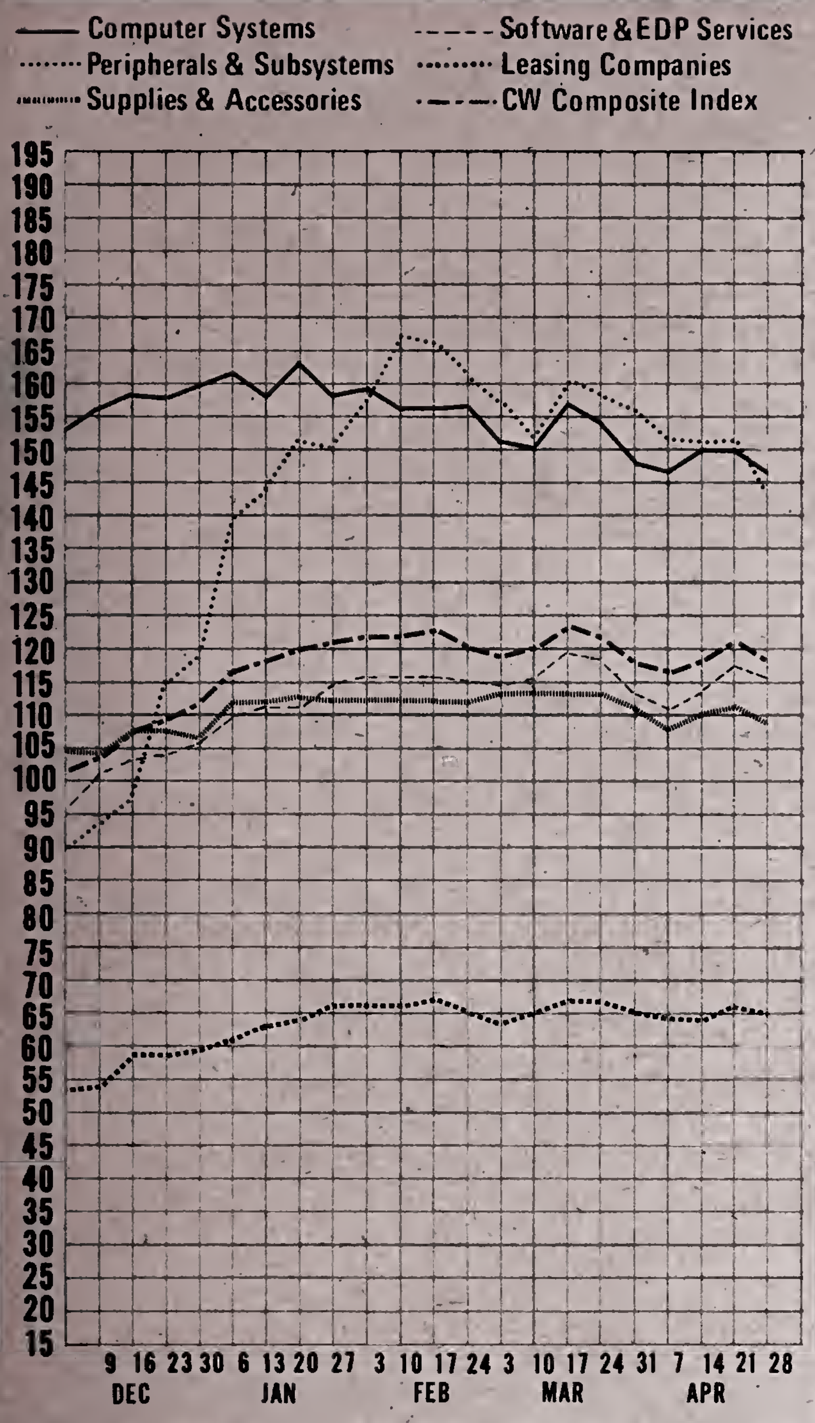

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Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.40	a$.34
Revenue	45,934,610	39,303,275
Earnings	2,135,404	1,771,786
9 Mo Shr	1.11	a.96
Revenue	133,306,854	115,206,308
Earnings	5,835,589	4,978,065

a-Adjusted to reflect November 1976 three-for-two stock split.

SPERRY RAND

Three Months Ended Dec. 31

	1976 (000)	1975 (000)
Shr Ernd	$.96	$.98
Revenue	808,704	778,721
Earnings	36,688	34,998
9 Mo Shr	2.86	2.92
Revenue	2,372,912	2,307,959
Earnings	109,015	104,107

TALLY

Year Ended Jan. 2

	1977	1976
Shr Ernd	$1.05	$.43
Revenue	27,028,000	21,523,000
Tax Cred	1,615,000	412,000
Earnings	3,526,000	1,017,000
3 Mo Shr	.29	.20
Revenue	6,830,000	6,216,000
Tax Cred	321,000	274,000
Earnings	858,000	479,000

T-BAR

Year Ended Dec. 31

	a1976	1975
bShr Ernd	$.81	$.56
Revenue	6,507,904	4,690,525
Earnings	447,555	300,785

a-Final report. b-After adjusting for 7.5% stock dividend in April 1977, share earnings would be $.75 in 1976 and $.52 in 1975.

WUI

Year Ended Dec. 31

	1976	1975
Shr Ernd	$3.07	$2.63
Revenue	97,201,000	85,922,000
Earnings	8,479,000	7,313,000
3 Mo Shr	.82	.68
Revenue	25,528,000	22,451,000
Earnings	2,248,000	1,890,000

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 27, 1977

All statistics compiled,
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COMPUTER SYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 27 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	23- 40	26 1/4	-2	-7.0
N	BURROUGHS CORP	55-108	56 3/8	-4 5/8	-7.5
C	COMPUTER AUTOMATION	10- 25	22 5/8	- 3/8	-1.6
N	CONTROL DATA CORP	18- 27	20 5/8	-1 5/8	-7.3
N	DATA GENERAL CORP	35- 60	37 1/4	- 3/4	-1.9
O	DATAPOINT CORP	18- 46	19 1/4	-1	-4.9
N	DIGITAL EQUIPMENT	37- 60	39 3/8	- 5/8	-1.5
N	ELECTRONIC ASSOC.	2- 5	2	- 1/8	-5.8
A	ELECTRONIC ENGINEER.	7- 16	7 7/8	- 7/8	-10.0
O	FOUR-PHASE SYSTEMS	13- 21	14 1/4	- 5/8	-4.2
N	FOXBORO	28- 52	50 1/4	-1	-1.9
O	GENERAL AUTOMATION	4- 11	6 3/4	- 3/8	-5.2
O	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	69-117	69 1/4	-4	-5.4
N	HONEYWELL INC	34- 56	49 3/4	-1 7/8	-3.6
N	IBM	227-288	261 1/4	-8 3/4	-3.2
O	MANAGEMENT ASSIST	1- 9	5 3/4	+ 1/4	+4.5
O	MEMOREX	17- 33	25	- 5/8	-2.4
O	MICRODATA CORP	7- 28	8	- 1/4	-3.0
C	MODULAR COMPUTER SYS	3- 14	7	+ 1/8	+1.8
N	NCR	24- 38	33 1/4	-1 1/2	-4.3
O	PRIME COMPUTER INC	4- 18	13	0	0.0
N	PERKIN-ELMER	17- 27	16 7/8	-1 1/4	-6.8
N	RAYTHEON CO	45- 67	61 1/8	- 7/8	-1.4
N	SPERRY RAND	34- 52	34	-1 3/8	-3.8
O	SYCOR INC	8- 31	8 5/8	+ 3/8	+4.5
A	SYSTEMS ENG. LABS	5- 10	6	- 1/4	-4.0
N	VARIAN ASSOCIATES	12- 19	18 3/4	+ 1/8	+0.6
A	WANG LABS.	11- 20	15 1/4	+ 1/2	+3.3

LEASING COMPANIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 27 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COURIER CORP	1- 10	9	-1	-10.0
O	COMDISCO INC	3- 13	10 1/4	- 3/4	-6.8
A	COMMERCE GROUP CORP	2- 3	2	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	1 1/8	0	0.0
M	DATRONIC RENTAL	1- 8	1	0	0.0
A	DCL INC	1- 2	1 1/4	0	0.0
N	DPF INC	5- 8	6 3/8	- 1/4	-3.7
N	ITEL	6- 16	13 3/8	+ 3/8	+2.8
N	LEASCO CORP	6- 22	22	- 3/8	-1.6
O	LEASPAC CORP	0- 1	1/2	- 1/4	-33.3
O	NRG INC	0- 1	1/8	0	0.0
A	PIONEER TEX CORP	6- 11	8 1/8	0	0.0
N	U.S. LEASING	7- 12	11	- 1/8	-1.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

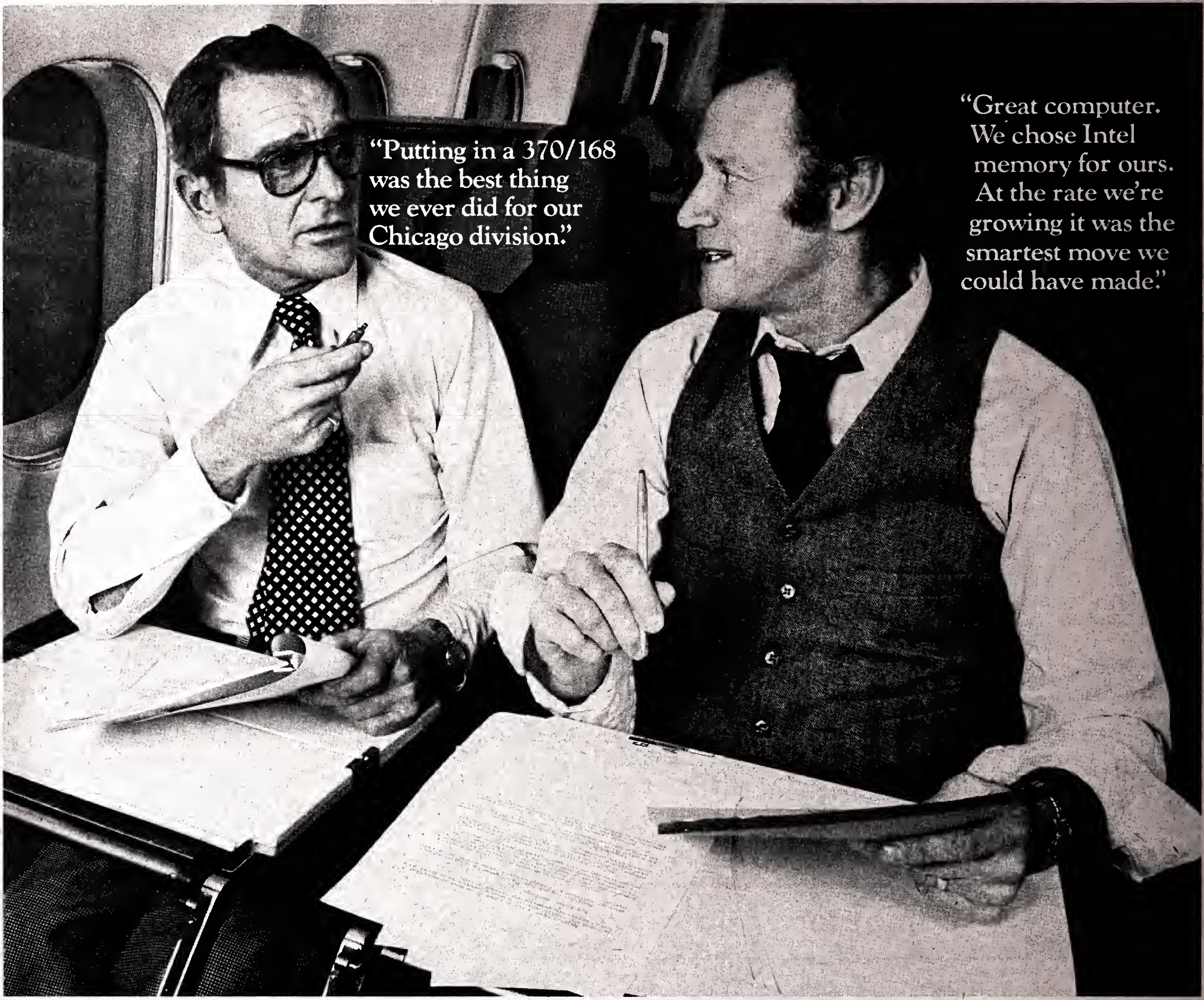
EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 27 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1	+ 1/8	+14.2
O	ANACOMP INC	6- 11	8 3/4	+ 1/4	+2.9
A	APPLIED DATA RES.	2- 7	5 1/2	0	0.0
N	AUTOMATIC DATA PROC	17- 35	23 3/8	-1 5/8	-6.5
O	COLEMAN AMERICAN COS	2- 6	1 7/8	0	0.0
O	COMPU-SERV NETWORK	3- 15	11	-1 1/2	-12.0
O	COMP ELECTION SYSTMS	5- 9	8 1/2	- 1/4	-2.8
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
O	COMPUTER NETWORK	2- 8	5 7/8	+ 1/8	+2.1
N	COMPUTER SCIENCES	4- 9	7 1/4	- 3/8	-4.9
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	2- 6	2	- 1/8	-5.8
O	COMSHARE	2- 9	5	0	0.0
D	DATA DIMENSIONS INC	2- 5	4	- 1/8	-3.0
O	DATATAB	1- 2	2 1/8	0	0.0
N	ELECTRONIC DATA SYS.	12- 19	16	-1	-5.8
O	INSYTE CORP	1- 3	1 3/4	0	0.0
C	IPS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	3 3/4	+ 1/8	+3.4
C	KEYDATA CORP	1- 5	2 1/8	0	0.0
A	LOGICON	3- 16	14	+ 3/8	+2.7
A	MANAGEMENT DATA	1- 3	1 1/4	+ 1/8	+11.1
A	NATIONAL CSS INC	13- 25	20	- 3/4	-3.6
O	NATIONAL DATA CORP	4- 7	4 3/4	- 1/2	-9.5
A	ON LINE SYSTEMS INC	17- 23	17 7/8	- 1/8	-0.6
N	PLANNING RESEARCH	3- 5	3 5/8	0	0.0
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	2- 5	2	- 1/8	-5.8
O	REYNOLDS & REYNOLD	13- 21	17 1/4	-1	-5.4
O	SCIENTIFIC COMPUTERS	1- 2	2 1/8	- 1/4	-10.5
O	TYMSHARE INC	14- 28	16 1/2	-1	-5.7
A	URS SYSTEMS	3- 5	4 1/8	0	0.0
N	WYLY CORP	1- 7	1 1/2	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 27 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 14	10 1/8	- 7/8	-7.9
O	ADVANCED MEMORY SYS	4- 10	7 1/4	0	0.0
N	AMPEX CORP	5- 10	7 3/4	- 1/4	-3.1
O	ANDERSON JACOBSON	2- 4	3 1/2	0	0.0
N	APPLIED DIG DATA SYS	10- 25	11	- 1/4	-2.2
O	BEEHIVE INT'L	3- 12	10	- 1/4	-2.4
A	BOLT,BERANEK & NEW	7- 11	6 7/8	- 3/8	-5.1
N	BUNKER-RAMO	5- 12	10 1/8	-1 1/8	-10.0
A	CALCOMP	3- 7	2 7/8	- 1/4	-8.0
O	CAMBRIDGE MEMORIES	0- 6	3/4	-	-7.7
N	CENTRONICS DATA COMP	20- 36	22 3/4	-2	-8.0
O	CODEX CORP	22- 47	41 3/4	-3 1/4	-7.2
C	COGNITRONICS	1- 1	7/8	0	0.0
O	COMPUTER COMMUN.	1- 6	4 5/8	- 3/8	-7.5
O	COMPUTER CONSOLES	4- 7	5	- 1/4	-4.7
A	COMPUTER EQUIPMENT	1- 3	2 3/4	+ 1/8	+4.7
C	COMPUTER TRANSCEIVER	1- 3	1 1/8	0	0.0
O	COMTEN	4- 13	11 1/4	- 1/8	-1.0
N	CONRAC CORP	20- 27	26 1/8	-1 1/8	-4.1
O	DATA ACCESS SYSTEMS	1- 5	5	0	0.0
O	DATA 100	6- 13	7	- 1/4	-3.4
A	DATA PRODUCTS CORP	5- 15	9 1/2	- 1/2	-5.0
D	DATA TECHNOLOGY	1- 4	3 5/8	+ 7/8	+31.8
C	DATUM INC	1- 2	1 1/2	0	0.0
C	DECISION DATA COMPUT	1- 4	1 5/8	- 1/4	-13.3
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
N	ELECTRONIC M & M	1- 5	4 1/4	- 1/8	-2.8
D	FABRI-TEK	1- 2	1 1/8	0	0.0
D	GENERAL COMPUTER SYS	0- 2	3/4	+ 1/4	+50.0
N	HAZELTINE CORP	4- 12	8 5/8	-1 1/8	-11.5
N	HARRIS CORP	27- 39	36 1/2	-1 1/8	-2.9
A	INCOTERM CORP	9- 20	12 1/4	-1	-7.5
O	INFOREX INC	3- 7	5	- 3/4	-13.0
O	INFORMATION INTL INC	10- 18	11 1/2	- 1/2	-4.1
O	INTEL CORP	38-109	41	-3 1/2	-7.8
A	LUNDY ELECTRONICS	3- 7	5	- 1/2	-9.0
C	MSI DATA CORP	3- 8	7 1/2	0	0.0
N	MOHAWK DATA SCI	3- 10	5 3/8	+ 1/8	+2.3
O	PENRIL CORP	1- 4	4 3/4	+ 1/4	+5.5
A	PERTEC CORP	3- 9	6 7/8	- 1/4	-3.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	2- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/8	0	0.0
O	RECOGNITION EQUIP	6- 11	7 1/8	- 1/2	-6.5
C	SCAN DATA	1- 4	1 5/8	+ 1/8	+8.3
D	STORAGE TECHNOLOGY	9- 13	10 1/4	- 1/2	-4.6
D	T BAR INC	5- 10	9	- 1/8	-1.3
D	TALLY CORP.	4- 6	4 3/8	- 1/2	-10.2
O	TEC INC	3- 9	7 3/4	- 1/4	-3.1
N	TEKTRONIX INC	45- 69	58 1/4	-1 3/4	-2.9
N	TELEX	2- 5	2 3/8	- 1/8	-5.0
O	WILTEK INC	1- 2	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 27 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	2- 5	2 1/4	- 1/8	-5.2
A	BARRY WRIGHT	6- 13	12 1/8	- 3/8	-3.0
O	CYBERMATICS INC	0- 1	1/2	0	0.0
C	DUPLEX PRODUCTS INC	13- 24	15 1/2	- 1/4	-1.5
N	ENNIS BUS. FORMS	6- 8	6	0	0.0
O	GRAHAM MAGNETICS	8- 14	11 3/4	- 3/4	-6.0
O	GRAPHIC CONTROLS	13- 19	15 3/4	+ 1/4	+1.6
N	3M COMPANY	48- 66	48 1/2	-2 1/4	-4.4
O	MOORE CORP LTD	30- 51	30 1/2	- 1/2	-1.6
N	NASHUA CORP	11- 20	17 1/8	- 7/8	-4.8
O	STANDARD REGISTER	15- 22	21	- 1/2	-2.3
O	TAB PRODUCTS CO	5- 17	16	0	0.0
N	UARCO	19- 25	20	- 1/4	-1.2
A	WABASH MAGNETICS	4- 14	12 1/2	- 1/4	-1.9
N	WALLACE BUS FORMS	18- 25	17 5/8	- 1/8	-0.7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